The Bioterrorist Next Door

Man-made killer bird flu is here. Can -- should -- governments try to stop it?

BY LAURIE GARRETT | DECEMBER 15, 2011
In September, an amiable Dutchman stepped up to the podium at a scientific meeting convened on the island of Malta and announced that he had created a form of influenza that could well be the deadliest contagious disease humanity has ever faced. The bombshell announcement, by virologist Ron Fouchier of Erasmus Medical Center, sparked weeks of vigorous debate among the world’s experts on bioterrorism, influenza, virology, and national security over whether the research should have been performed or announced and whether it should ever be published.

Meanwhile, a joint Japanese-American research team led by the University of Wisconsin’s Yoshihiro Kawaoka says that it, too, has manufactured a superflu. Additionally, a team at the U.S. Centers for Disease Control and Prevention (CDC) in Atlanta has acknowledged doing similar research, without successfully making the über flu.
The U.S. National Science Advisory Board for Biosecurity is now deliberating whether to censor publication of the Fouchier and Kawaoka papers, though it lacks any actual power to do so: It could so advise scientific journals, but editors would still decide. The advisory board is expected to release its decision on Dec. 15.

The interest in this brave new world of biology is not limited to the scientific community. U.S. Secretary of State Hillary Clinton made a surprise visit to Geneva on Dec. 7, addressing the Biological Weapons Convention review conference. The highest-ranking U.S. official to speak to the biological weapons group in decades, Clinton warned, "The emerging gene-synthesis industry is making genetic material widely available. This obviously has many benefits for research, but it could also potentially be used to assemble the components of a deadly organism."

"A crude but effective terrorist weapon can be made by using a small sample of any number of widely available pathogens, inexpensive equipment, and college-level chemistry and biology," Clinton also stated. "Less than a year ago, al Qaeda in the Arabian Peninsula made a call to arms for, and I quote, 'brothers with degrees in microbiology or chemistry to develop a weapon of mass destruction.'"

Noting that "It is not possible, in our opinion, to create a verification regime" for biological weapons compliance under the convention, Clinton called for voluntary transparency on biological experimentation among the 165 countries that have signed the agreement.

Officials throughout the U.S. government are declining to comment on the influenza experiments or elaborate on Clinton's comments and appearance in Geneva. The influenza scientists were politely but firmly instructed recently by U.S. officials to keep their mouths shut and provide no data or details regarding their experiments to anybody. Sources inside the Dutch, German, and French governments say that discreet agreement was reached among Western leaders to greet the influenza pronouncements with a wall of silence, pending the advisory board's decision.
and detailed analysis of the experiments by classified intelligence and scientific bodies.

Laurie Garrett is senior fellow for global health at the Council on Foreign Relations, recipient of the 1996 Pulitzer Prize for her coverage of the Ebola epidemic in what was then Zaire, and author of I Heard the Sirens Scream: How Americans Responded to the 9/11 and Anthrax Attacks.

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December 15, 2011

Sounds bad!
Scary reading!

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Thin wall of terrorist ignorance now protects us


Richard Danzig, a former Navy secretary and now a biowarfare consultant to the Pentagon, said that while there are 1,000 to 10,000 "weaponers" worldwide with experience working on biological
arms, there are more than 1 million and perhaps many millions of "broadly skilled" scientists who, while lacking training in that narrow field, could construct bioweapons. "It seems likely that, over a period between a few months and a few years, broadly skilled individuals equipped with modest laboratory equipment can develop biological weapons," Danzig said. "Only a thin wall of terrorist ignorance and inexperience now protects us."

"The main thing that stands between the human species and the creation of a supervirus is a sense of responsibility among individual biologists." -The Demon in the Freeze, page 227

**Good**

Bioterrorism is the intentional use of microorganisms to bring about ill effects or death to humans, livestock, or crops. The use of microorganisms to cause disease is a growing concern for public health officials and agricultural bodies. The terrorist attacks on September 11, 2001 and the subsequent bio-terrorist releases of anthrax have led to an increased awareness of workplaces as possible terrorist targets. Specific OSHA Safety and Health Topics Pages are available on Plague, Ricin, Smallpox, Tularemia and Viral Hemorrhagic Fevers (VHFs). There is also an OSHA Anthrax eTool. There are currently no specific OSHA standards or directives for bioterrorism.

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OSHA Standards

This section highlights OSHA standards, preambles to final rules (background to final rules) and directives (instructions for compliance officers) related to bioterrorism. For additional information, see the Emergency Preparedness and Response Safety and Health Topics Page.

Note: Twenty-five states, Puerto Rico and the Virgin Islands have OSHA-approved State Plans and have adopted their own standards and enforcement policies. For the most part, these States adopt standards that are identical to Federal OSHA. However, some States have adopted different standards applicable to this topic or may have different enforcement policies.

General Industry (29 CFR 1910)

1910 Subpart H, Hazardous materials [related topic page]
1910.120, Hazardous waste operations and emergency response [related topic page]
1910.120(q), Emergency response program to hazardous substance releases

Construction Industry (29 CFR 1926)

1926 Subpart D, Occupational health and environmental controls
1926.65, Hazardous waste operations and emergency response

Preambles to Final Rules

Hazardous Waste Operations and Emergency
Response (1989)
Intro to 29 CFR Part 1910, Hazardous Waste Operations and Emergency Response
I. Background
II. Summary and Explanation of the Standard
VII. State Plan States
VIII. Federal and State Coverage of the Public Sector and Volunteers

Search all available preambles to final rules.

Directives

Inspection Procedures for 29 CFR 1910.120 and 1926.65, Paragraph (q): Emergency Response to Hazardous Substance Releases. CPL 02-02-073, (2007, August 27). Also available as a 444 KB PDF, 119 pages. Updates enforcement procedures for compliance officers who need to conduct inspections of emergency response operations. It defines additional terms and expands on training requirements for emergency responders and other groups such as skilled support personnel. This OSHA instruction revises CPL 02-02-059, issued April 24, 1998.

Compliance policy for emergency action plans and fire prevention plans. CPL 02-01-037 [CPL 2-1.037], (2002, July 9).

Search all available directives.

Hazard Recognition

Due to the potential exposure to deadly microorganisms a bioterrorism incident poses a
considerable health risk to those exposed and "first responders". These responders may include public health officials, law enforcement, firefighters, paramedics, and the military. There are an unlimited number of potential biological agents that could be used in bioterrorism attacks, although some are more deadly and likely to be used than others. Biological agents include bacterial agents, toxins, and viruses.

The following links provide information about recognizing bioterrorism hazards. For more information about specific agents, see OSHA's Anthrax eTool and Botulism, Plague, Ricin, Smallpox, Tularemia, and Viral Hemorrhagic Fevers (VHFs) Safety and Health Topics Pages.


Infectious Diseases (USAISRID), (2009, April). Site provides ordering instructions for Medical Management of Biological Casualties Handbook, Sixth Edition which includes information and recommendations regarding medical response to a biological warfare attack on a civilian or military population. Contains specific information on a number of potential bioterrorist agents. Other reference material is also available for free download.

Defense Against Toxin Weapons [230 KB PDF, 60 pages]. US Army Medical Research Institute of Infectious Diseases, (1997). Discusses many biological toxins, including ricin, botulism, and others.

Kortepeter, Mark G. and Gerald W. Parker. "Potential Biological Weapons Threats." Pages 523-527. Discusses various biological agents that may be used in bioterrorist attacks.

Kozazyn, Linda B. "Knowledge Key to Combating Chemical, Biological Warfare." American Forces Information Service News Articles. Advises service members to be aware of and educate themselves about the growing chemical-biological threat.

Emergency Response

The following references detail the development
of methods to determine exposure to biological agents; provide first response information; and link to federal, state, and local contact information in the event of an emergency.


Interim Bioterrorism Readiness Plan Suggestions [410 KB PDF, 64 pages]. Association for Professionals in Infection Control and Epidemiology, Inc. (APIC), Bioterrorism Working Group, (2002, April). Summarizes suggestions by APIC Bioterrorism Advisors, infection control practitioners (ICPs), members, and agency liaisons to facilitate preparation of bioterrorism...
reasons to facilitate preparation of bioterrorism readiness plans for individual and regional institutions.


Control

Due to the time lapse between exposure and the onset of symptoms following a bioterrorist attack, such attacks are difficult to determine and control. With the rapid transit network in the US, people could be exposed in one area and then return home before developing symptoms, potentially exposing hundreds of other people. The following
References provide ways to prepare for responding to a bioterrorist attack, including state and federal disease surveillance and epidemiology, stockpiling vaccine for emergency use, mass vaccination of first responders, and training for medical personnel.

Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks. US Department of Health and Human Services (DHHS), National Institute for Occupational Safety and Health (NIOSH) Publication No. 2002-139, (2002, May). Identifies actions that a building owner or manager can implement without undue delay to enhance occupant protection from an airborne chemical, biological, or radiological attack.

Public health response to biological and chemical weapons: WHO guidance. World Health Organization (WHO), (2004). Addresses public health issues surrounding a chemical/biological attack, and provides risk management principles for planning a response to such an attack. Also describes international sources of assistance.

Improving Local and State Agency Response to Terrorist Incidents Involving Biological Weapons [802 KB PDF, 60 pages]. Edgewood Chemical Biological Center, (2003, June 1). Provides a thorough set of recommendations for local response to bioterrorism. Includes a biological weapons response plan in a 13-component response template.

Biological Warfare: A Nation at Risk – A Time to


McDade, Joseph E. "Addressing the Potential Threat of Bioterrorism – Value Added to an Improved Public Health Infrastructure." Pages 591-592. Addresses the benefits of preparing for a bioterrorist attack.

Hamburg, Margaret A. "Addressing Bioterrorist Threats: Where Do We go from Here?" Pages 564-565. Describes what needs to be done at local, state, and federal levels to prepare for a bioterrorist attack.

Russell, Phillip K. "Vaccines in Civilian Defense Against Bioterrorism." Pages 531-533. Discusses the feasibility of using immunizations as a defense against bioterrorism, both at the military and general public level. It calls special attention to the
general public level. It calls special attention to the feasibility of administering smallpox and anthrax vaccines to the general public.

Shalala, Donna E. "Bioterrorism: How Prepared Are We?" Pages 492-493. Addresses what government organizations must do to prepare for a bioterrorist attack.

Stern, Jessica. "The Prospect of Domestic Bioterrorism." Pages 517-522. Addresses the main factors that motivate and inhibit bioterrorist groups.


Secretary Thompson Testifies on Bioterrorism Preparedness. US Department of Health and Human Services (DHHS), (2001, October 3). Includes statements made by DHHS Secretary Tommy G. Thompson before the Senate Appropriations Subcommittee on Labor, Health and Human Services, Education and Related Agencies concerning bioterrorism preparedness.

Preparedness for Bioterrorism

Defending Against Invisible Killers - agency Biological Agents. US Department of Defense (DoD). Describes military biological agent concerns, including methods of deployment, detection systems, vaccination, and physical protective equipment.

Thanks

agenda software

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Bioterrorism is a criminal act against unsuspecting civilians using pathogenic biological agents, such as biological warfare agents. Bioterror and Biological Warfare agents are most often colorless, by-and-large odorless microorganisms (bacteria, viruses, fungi) or toxins (usually protein toxins) derived from microorganisms that can be spread in air as aerosols or in food or drink to infect as many people as possible. They are easily concealed, and thus difficult to detect before an attack. They are also difficult to detect when released, so a biowarfare or bioterror attack would be difficult to ascertain, especially due to the usually nondescript initial signs and symptoms expected in casualties from such an attack. Their main advantages to terrorists are allowing easy escape and causing panic and chaos within a nation's ability to deal with the public health threat posed by bioterrorism.
escape and causing panic and chaos within a civilian population. Their aim is to overwhelm emergency medical departments at local hospitals and clinics. However, there are ways to help protect yourself against bioterror agents and by extrapolation biological warfare agents and to help identify an attack when it occurs.

Terror not Casualties is the Objective

The most likely target for bioterrorism is a major city or other densely crowded areas, such as transportation hubs, major sports events or public rallies and especially government buildings. Although recently even civilians in remote areas were frightened enough to seek medical attention for what they perceived was a bioterror attack, in reality an attack in a remote area would be extremely unlikely. In high population density areas, the ventilation systems in large buildings might be especially tempting targets, as these are rarely protected. As we have seen, practically any delivery system can be used to penetrate an office building, even a letter delivered by the postal service. Once an attack has occurred, most biological agents (see below) would need an incubation period of several days in order to cause sickness. As mentioned above, this has the advantage of allowing a bioterrorist time to escape or perform undetected other acts of terrorism. Thus a single bioterrorist could 'hit' several targets long before an attack was suspected. Even with large numbers of people exhibiting nonspecific signs and symptoms within a few days after an attack, it would take some time for the medical community to recognize these events as a
community to recognize these events as a bioterror attack. This is primarily due to the expected dispersed nature of patients seeking medical attention at different institutions and at different times.

The recent outbreak of inhalation anthrax in Florida and cutaneous anthrax in New York in the first week of October 2001 might be an example of a fairly restricted bioterror attack. In this case a very modest amount of anthrax spores caused only a few casualties and one death but caused tremendous panic in the local populous. Early reports from government agencies were directed at restoring public confidence by reassuring people that this was an isolated incident and denying that a potential bioterror attack had even occurred. Later authorities had to admit that an attack had indeed occurred. The lesson was that we should not expect authorities to be immediately candid about a bioterror attack.

Bioterrorism does not have to cause large numbers of immediate deaths to be effective. Most biological agents do not cause widespread immediate fatalities, or even large numbers of deaths within days of exposure, and most exposed patients might not even have a life-threatening disease. The main functions of bioterrorism are to cause panic, disruption and chaos, so biological agents don't have to cause a fatal disease to be effective. In fact, many biological warfare agents are categorized as 'incapacitating agents' that are not intended to produce a fatal disease (Table 1). They are more
effective if they incapacitate and produce strain on a health care system by having many thousands of sick patients inundate treatment facilities that contain only limited quantities of drugs and only a few isolation beds. Also, it is much easier to spread an incapacitating agent from person to person, because it would not cause enough alarm to require quarantining of exposed persons, which could limit additional exposures. Recent Ebola virus outbreaks in the Congo suggest that the most effective method to limit casualties is to quickly quarantine anyone who shows signs and symptoms of hemorrhagic fever. Incapacitating agents often have relatively long incubation times, allowing their widespread penetration into a population before they are ever diagnosed. Thus exposed individuals may bring the agent back 'home' to an unsuspecting family member and spread the disease further. This may have happened to veterans with chronic infections, such as Mycoplasma and Brucella infections, who returned from the Gulf War only to slowly spread their chronic illnesses to spouses and children.

Biological Agents and Bioterrorism

There are several types of biological agents that could be useful for bioterrorism. First, there are lethal agents, such as the Ebola, Lassa and other viruses that cause viral hemorrhagic fever, inhalation anthrax caused by Bacillus anthracis spores, smallpox virus, pneumonic plague caused by Yersinia pestis or purified protein toxins, such as the Ricinus communis toxin ricin or Clostridium botulinum toxin (Table 1). In addition, there are
incapacitating agents that cause brucellosis, mediated by Brucella species, Q fever caused by Coxiella burnetii, tularemia caused by Francisella tularensis, mycoplasmal infections caused by Mycoplasma fermentans and mold toxins, such as the T2 mycotoxin. As mentioned above, incapacitating agents for the most part cause chronic illnesses that are not usually fatal. However, these illnesses can cause tremendous chronic health problems in infected patients, and most are contagious and the disease could spread and eventually cause an epidemic of chronic illnesses.

thank

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good

Since the terrorist attacks on Sept. 11 destroyed the World Trade Center in New York, damaged the Pentagon and killed about 3,000 people, the Illinois Department of Public Health, local health departments, health professionals and others have received questions from the public about the possibility of bioterrorism and ways to protect themselves. The following “frequently asked questions” were developed to answer some of those inquiries. Persons also should consider contacting their local health department, physician or local emergency preparedness office for additional information.

What precautions should I take regarding the threat of bioterrorism?
The Illinois Department of Public Health and the federal government are not recommending any specific bioterrorism-related precautions. However, in the event of a natural (for example, tornado, flood or earthquake) or man-made disaster, lives can be saved if people are prepared for the emergency. Every family should have the following emergency supplies on hand:

- A battery-powered radio and a flashlight, with extra batteries to each
- Bottled drinking water — one gallon per day per person, with a three- to seven-day supply recommended
- Canned or sealed package foods that do not require refrigeration or cooking, and a can opener
- A blanket or sleeping bag for each family member
- First-aid kit, including any special prescription medications, such as insulin or heart tablets
- Toilet paper and paper towels
- Extra set of car keys, and a credit card, cash or traveler’s checks
- Special items for infant (disposable diapers), elderly or disabled family members
- Extra eye glasses, and contact lenses and supplies

For more information, please refer to the Illinois Department of Public Health’s Surviving Disasters: A Citizen’s Emergency Handbook.

What is the Illinois Department of Public Health (IDPH) doing to protect the public from bioterrorism? Preventing an attack is the job of law enforcement -- the FBI, state and local police, and other law enforcement agencies.
If an attack should occur, IDPH has developed plans to minimize the risk and to treat those who may become ill. Working closely with other federal and state agencies, including local health departments, hospitals, laboratories and law enforcement, and with doctors, nurses, paramedics and other medical personnel, IDPH has implemented an enhanced surveillance system that is constantly on guard for unusual clusters of disease. In the past two years, more than 1,000 medical and public health personnel have been trained to identify diseases that could be caused by bioterrorists. If a cluster is detected, public health is prepared to move quickly to identify the disease and its possible source. Public health information, treatment options and other advice would be provided to the public through the news media. Keep in mind, however, an attack may not be obvious for days to weeks depending on the incubation period of the disease.

The Illinois Department of Public Health is part of the Governor’s Illinois Terrorism Task Force. This task force would direct a coordinated effort among law enforcement, fire departments, emergency management, public health and other agencies at the local, state and federal level in the event of a bioterrorist attack.

How can I tell if a letter or package is suspicious? According to the FBI, you should look for certain indicators. For example, check the postmark to see if it was mailed from a foreign country. Also check for no return address and for restrictive markings such as “personal” or “confidential.” Look for misspelled words or incorrect title.
Look for misspelled words or incorrect titles.

Suspect letters or packages may be rigid or bulky and have excessive tape or string around them. They may exhibit a strange odor.

What should I do if I receive a suspicious letter or package?

Do not shake or empty contents of any suspicious envelope or package; DO NOT try to clean up powders or fluids.
Place the envelope or package in a plastic bag or some other type of container to prevent leakage of contents.
If you do not have a container, then cover the envelope or package with anything (e.g. clothing, paper, trash can, etc.) available and do not remove this cover.
Leave the room and close the door, or section off the area to prevent others from entering.
Wash your hands with soap and water to prevent spreading any powder to your face or skin.
If you are at home, then report the incident to local police. If you are at work, report the incident to local police and notify your building security official or an available supervisor.
If possible, list all people who were in the room or area when this suspicious letter or package was recognized. Give this list to both the local police and local public health authorities for follow up investigation and advice.
Remove heavily contaminated clothing and place in a plastic bag that can be sealed. Give the bag to law enforcement personnel.
Shower with soap and water as soon as possible.
Do not use bleach or disinfectant on your skin.
Are vaccinations recommended to protect against
What is anthrax?
Anthrax is a disease caused by an organism acquired following contact with an infected animal or contaminated animal product or following the intentional release of anthrax spores as a biological weapon. In a bioterrorist attack, health authorities are concerned about anthrax spores being released into the air where they can be breathed in a person’s lungs. Anthrax is not spread person to person. The last reported case of anthrax in Illinois was in 1960.

How is anthrax transmitted?
Anthrax infection can occur in three forms: cutaneous (skin), inhalation and gastrointestinal. B. anthracis spores can live in the soil for many years, and humans can become infected with anthrax by handling products from infected animals or by inhaling anthrax spores from contaminated animal products. Anthrax can also spread by eating undercooked meat from infected
animals. It is rare to find infected animals in the United States.
What are the symptoms of anthrax? Symptoms of disease usually develop within 7 days of exposure depending on how the disease was contracted, with most cases occurring within 48 hours of exposure. However, incubation periods of up to 60 days are possible.

Cutaneous: Most (about 95 percent) anthrax infections occur when the bacterium enters a cut or abrasion on the skin, such as when handling contaminated wool, hides, leather or hair products (especially goat hair) of infected animals. Skin infection begins as a raised itchy bump that resembles an insect bite but within 1-2 days develops into a vesicle and then a painless ulcer, usually 1-3 cm in diameter, with a characteristic black necrotic (dying) area in the center. Lymph glands in the adjacent area may swell. About 20 percent of untreated cases of cutaneous anthrax will result in death. Deaths are rare with appropriate antimicrobial therapy.

Inhalation: Initial symptoms may resemble a common cold. After several days, the symptoms may progress to severe breathing problems and shock. After the onset of symptoms, inhalation anthrax is usually fatal. Early antibiotic treatment of disease before onset of symptoms increases the chances for survival.

Intestinal: The intestinal disease form of anthrax may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract. Initial signs of nausea, loss of appetite, vomiting, fever are followed by abdominal pain, vomiting of blood and severe
abdominal pain, vomiting or blood and severe diarrhea. Intestinal anthrax results in death in 25 percent to 60 percent of cases. Should I have a supply of antibiotics? There are numerous germs a bioterrorist may use in an attack: anthrax, botulism, cholera, plague, Q fever, salmonella, smallpox, tularemia and viral hemorrhagic fever. Many antibiotics are effective for a variety of diseases, but there is no antibiotic effective against all diseases. Keeping a supply of antibiotics poses other problems because there is a limited shelf life before they lose their strength. There is currently no justification for taking antibiotics. Antibiotics should only be taken with medical supervision. The federal government has stockpiled antibiotics for large-scale distribution in the event of a bioterrorist attack. Known as the CDC's National Pharmaceutical Stockpile, it was designed to ensure the availability and rapid deployment of life-saving pharmaceuticals, antidotes, other medical supplies and equipment to any U.S. location in the event of a terrorist attack involving a biological or chemical agent. What about smallpox vaccine? As the result of a successful worldwide effort to eradicate smallpox, smallpox vaccine was removed from the commercial market in 1983. Routine vaccinations were stopped in the U.S. in 1972 because many people experienced side effects and there was almost no risk of getting smallpox. The United States Public Health Service maintains an emergency stockpile of approximately 15 million doses of smallpox vaccine and the federal government has recently
Vaccine and the federal government has recently announced plans to accelerate production of a new smallpox vaccine. The U.S. Centers for Disease Control and Prevention (CDC) would only recommend vaccination if there was clear evidence that the disease had resurfaced and people in the U.S. were at risk of acquiring infection. For more information, consult the current U.S. Public Health Service’s Advisory Committee on Immunization Practices recommendations on smallpox vaccination.

If I was vaccinated against smallpox before 1972, am I still protected? Probably not. Vaccination has been shown to wear off in most people after 10 years, but may last longer if the person has been successfully vaccinated on multiple occasions. If health authorities determine you have been exposed to smallpox and are at risk of infection, they would recommend that you be re-vaccinated immediately.

What is smallpox? Smallpox is a disease caused by the variola virus. It can be easily spread from person to person and transmission usually occurs only after the patient develops a fever and rash. After the incubation period, the patient experiences high fever, malaise, headache and backache. Severe abdominal pain and delirium are sometimes present. The last naturally acquired case of smallpox in the world occurred in October 1977 in Somalia; the last cases recorded in Illinois were recorded in 1947.

All known variola virus stocks are held under
security at the CDC or at the State Research Centre of Virology and Biotechnology in Russia. Should I buy a gas mask? No. A mask would only offer some protection if you were wearing it at the exact moment that a bioterrorist attack occurred. Most likely, a release of a biological agent would be done without anyone's knowledge. To wear a mask at all times, or just in case of a bioterrorist attack, is impractical, if not impossible.

(SOURCES: Illinois Department of Public Health, U.S. Centers for Disease Control and Prevention, U.S. Department of Defense and Johns Hopkins University Center for Civilian Biodefense Studies)

thank

(professional web design in chicago)

**good**

Notably, the report gives the country a "D" across the board for the country's ability to develop and quickly approve medical countermeasures such as diagnostic tools and vaccines, which are crucial in outbreaks of all sizes.


In its report, the center says the U.S. has spent more than $65 billion on bio-defense during the past decade, but still has holes that leave it
vulnerable.

"Today we face the very real possibility that outbreaks of disease -- naturally occurring or man-made -- can change the very nature of America," the report concludes. Technology is also making it easier for terrorists to create deadly mischief, the report says.

A small team of individuals with graduate-level training and readily available equipment "could produce the type of bio-weapons created by nation-states in the 1960s," the report warns.

The threat isn't simply hypothetical, the report says. Ayman Zawahiri, the presumed leader of al Qaeda following the death of Osama bin Laden, is a medical doctor with a known interest in bioterrorism, having started a bio-weapons program in Afghanistan and Malaysia in 1999, the report notes.

The report's authors say they recognize that budget constraints are preventing governments from addressing all of the shortcomings in current bio-terror preparedness. They recommend focusing on potential large-scale outbreaks, saying such preparations would automatically improve preparedness for smaller outbreaks.

"If you focused just on the 'F' grades, you can pour a lot of money down that hole," said the center's Randy Larsen. "If we work to make D's into C's, that is the best strategy for the nation."

thanks
Don't buy the hype.

Don't buy the Fouchier hype until the data comes out. Check out this commentary by Columbia University virologist, Vincent Racaniello... http://bit.ly/rMoPVI

One person raised a valid point in the comments section of that piece:

"Surely, a weapon that would infect a large proportion of humanity with no known reason for selectivity, no vaccine against it and a 50-60% mortality rate would be an incredibly stupid weapon? Chances are that a large part of the terrorist's families will die, plus nobody is able to control it."

scary

That wouldn't stop research but would make deployment unlikely under normal circumstances. Unless of course you are dealing with a doomsday cult in which case it's the perfect thing to be researching and far more desirable than something like sarin or anthrax.

good

The Journal Nature has put together a special
online focus on the latest scientific information about anthrax and other potential bioweapons, the pre-publication of two research papers on anthrax toxin, as well as a collection of research, news, and feature articles from its electronic archive. Because of the heightened interest in this area, among both the scientific community and the general public, all material in this feature has been made freely available by Nature.

http://www.nature.com/nature/anthrax


Neff JM, Levine RH, Lane JM, et al. Complications of smallpox vaccination, United
1918 Avian Influenza - The Secondary Bacteria Pneumonia

Yoshihiro Kawaoka has for years worked to create a bird flu virus capable of killing humans the same way the 1918 avian influenza virus killed, so that a vaccine to prevent virulent avian influenza can be produced for use in mass inoculations.

The viruses which Fouchier and Kawaoka created separately may come close to what the 1918 virus was like, but the original virus was relatively mild and was not the reason so many people died; so vaccinating against a replicate of the original virus will not prevent what occurred in 1918.

What killed most of the victims was what was believed to be a "secondary" infection - a deep lung bacterial pneumonia which would have occurred sometime after the initial flu symptoms. Penicillin had not yet been developed.
The majority of 1918 pandemic deaths occurred during a bitterly cold winter (sometimes 15 to 20 degrees below zero). Due to the First World War, the immune systems of a great many people had been seriously compromised by malnutrition. Also due to that war, coal was in short supply, and more homes and public buildings were heated with wood fires. Unlike coal, wood smoke gives off "very fine" particles which can work their way deep into the lungs. Given the construction of houses in that day, no matter what fuel was used, the homes of most families would not have been well heated when the outdoor temperature was ten degrees above zero - much less when it was 15 to 20 degrees below zero.

Some articles indicate that the secondary pneumonia was caused when bacteria that normally inhabit the nose and throat invaded the lungs along a pathway created when the virus destroyed the cells that line the bronchial tubes and lungs. Perhaps, but with or without the virus, the cilia cells that line the bronchial tubes and lungs can be slowed in extremely cold weather. Wood smoke, some other forms of air pollution, and even chronic smoking can paralyze those cilia cells. Malnutrition increases the risk of pneumonia, persistent diarrhoea, and dysentery and the likelihood of a fatal outcome.

My skeptical nature causes me to ask, "How do we know that everyone reported to have died with avian influenza during the time of the 1918 pandemic had "actually" contracted avian influenza?" The medical system was too busy to
perform autopsies on many of them; there was "no" test for avian influenza; and seasonal influenza probably was occurring at the same time. The debacle of the 2009 swine flu pandemic demonstrated that the estimate of the total number of avian flu cases and deaths in 1918 had to be wildly inaccurate, because communication between disease control agencies, and busy hospitals and doctors in 1918 would have been at least ten times worse than it was in 2009.

Politics, the economy, and joblessness currently are rapidly increasing poverty, malnutrition, and homelessness around the world. Big Oil is increasing air pollution. In my opinion, if the public were mass vaccinated with one of Mr. Kawaoka's or one of Mr. Fouchier's live influenza viruses during an extraordinarily cold winter, hundreds of thousands of those receiving the vaccination would die from consequent bacterial pneumonia. I would expect the highest rate of bacterial pneumonia to occur where air pollution is greatest.

In Nature Medicine 12, 489 (2006) was the statement: 'If Yoshihiro Kawaoka owned a country, its citizens would be well protected from a bird flu pandemic. Confronted with a pandemic, Kawaoka says he would close his country's borders and release a vaccine based on the live, but weakened, bird flu virus. Some people might fall ill from the vaccine strain, but far greater numbers would benefit. "The immune response provided by live virus, that is going to be the one that really protects humans," Kawaoka says.'
Biological warfare is the intentional use of microorganisms, and toxins, generally of microbial, plant or animal origin to produce disease and/or death in humans, livestock and crops. The attraction for bioweapons in war, and for use in terroristic attacks is attributed to their low production costs, the easy access to a wide range of disease-producing biological agents, their non-detection by routine security systems, and their easy transportation from one location to another are other attractive features (Atlas, 1998). Their properties of invisibility and virtual weightlessness render detection and verification procedures ineffectual and make non-proliferation of such weapons impossible. Consequently, national security decision-makers defence professionals, and security personnel will increasingly be confronted by biological warfare as it unfolds in the battlefields of the future (Schneider and Grinntner, 1995).

Current concerns regarding the use of bioweapons result from their production for use in the 1991 Gulf War; and from the increasing number of countries that are engaged in the proliferation of such weapons i.e. from about four in the mid-1970s to about 17 today (Cole, 1995, 1997). A similar development has been observed with the proliferation of chemical weapons i.e. from about 4 countries in the recent past to some 20 countries in the mid-1990s.
23 countries in the mid-1980s (Hoogendorn, 1997).

Other alarming issues are the contamination of the environment resulting from dump burial (Miller, 1999), the use of disease-producing microorganisms in terrorist attacks on civilian populations; and non-compliance with the 1972 Biological and Toxins Weapons Convention (Table 1). The diverse roles of micro-organisms interacting with humans as "pathogens and pals" has been described with Leishmania infections, and with the presence of Bacteroides thetaiotaomicron in the intestines of humans and mice (Strauss, 1999). Also the development of "battle strains" of anthrax, bubonic plague, smallpox, Ebola virus, and of a microbe-based "double agent" has been reported (Thompson, 1999).

Biological/Chemical warfare characteristics

Biological, chemical and nuclear weapons possess the common property of wreaking mass destruction. Though biological warfare is different from chemical warfare, there has always been the tendency to discuss one in terms of the other, or both together. This wide practice probably arises from the fact that the victims of such warfare are biological in origin unlike that in the Kosovo War in which destruction of civic infrastructure, and large-scale disruption of routine facilities were the primary goals, e.g. the loss of electricity supplies through the use of graphite bombs. Another consideration is that several biological agents e.g. toxic metabolites produced by either micro-
organisms, animals or plants are also produced through chemical synthesis.

One of the main goals of biological warfare is the undermining and destruction of economic progress and stability. The emergence of biochemical warfare as a weapon of mass destruction can be traced to the development and use of biological agents against economic targets such as crops, livestock and ecosystems. Furthermore, such warfare can always be carried out under the pretexts that such traumatic occurrences are the result of natural circumstances that lead to outbreaks of diseases and disasters of either endemic or epidemic proportions.

Biological and chemical warfare share several common features. A rather comprehensive study of the characteristics of chemical and biological weapons, the types of agents, their acquisition and delivery has been made (Purver, 1995). Formulae and recipes for experimenting and fabricating both types of weapons result from increasing academic proficiency in biology, chemistry, engineering and genetic manipulations. Both types of weapons, to date, have been used in bio- and chemoterroristic attacks against small groups of individuals. Again, defence measures, such as emergency responses to these types of terrorism, are unfamiliar and unknown. A general state of helplessness resulting from a total lack of preparedness and absence of decontaminating strategies further complicates the issue.
The widespread ability and interest of non-military personnel to engage in developing chemical and biologically based weapons is linked directly to easy access to academic excellence world-wide. Another factor is the tempting misuse of freely available electronic data and knowledge concerning the production of antibiotics and vaccines, and of conventional weapons with their varying details of sophistication.

Several other factors make biological agents more attractive for weaponization, and use by terrorists in comparison to chemical agents (Table 2). Production of biological weapons has a higher cost efficiency index since financial investments are not as massive as those required for the manufacture of chemical and nuclear weapons. Again, lower casualty numbers are encountered with bigger payloads of chemical and nuclear weapons in contrast to the much higher numbers of the dead that result from the use of invisible and microgram payloads of biological agents.

To a great extent, application or delivery systems for biological agents differ with those employed for chemical and nuclear weapons. With humans and animals, systems range from the use of live vectors such as insects, pests and rodents to aerosol sprays of dried spores and infective powders. In the case of plants, proliferation of plant disease is carried out through delivery systems that use propagative material such as contaminated seeds, plant and root tissue culture materials, organic carriers such as soil and compost dressing, and use of water from
contaminated garden reservoirs.

In terms of lethality, the most lethal chemical warfare agents cannot compare with the killing power of the most lethal biological agents (Office of Technology Assessment, 1993). Amongst all lethal weapons of mass destruction - chemical, biological and nuclear, the ones most feared are bioweapons (Danzig and Berkowsky, 1997).

Biological agents listed for use in weaponization and war are many. Those commonly identified for prohibition by monitoring authorities are the causative agents of the bacterial diseases anthrax and brucellosis; the rickettsial disease Q fever; the viral disease Venezuela equine encephalitis (VEE), and several toxins such as enterotoxin and botulinum toxin.

As a rule, microbiologists have pioneered research in the development of a bioarmoury comprised of powerful antibiotics, antisera, toxoids and vaccines to neutralise and eliminate a wide range of diseases. However, despite the use of biological agents in military campaigns and wars (Christopher et al, 1997), it is only since the mid-1980s that the attention of the military intelligence has been attracted by the spectacular breakthroughs in the life sciences (Wright, 1985). Military interest, in harnessing genetic engineering and DNA recombinant technology for updating and devising effective lethal bioweapons is spurred on by the easy availability of funding, even in times of economic regression, for contractual research leading to the development
of:

vaccines against a wide variety of bacteria and viruses identified in core control and warning lists of biological agents used in biowarfare (Table 3) rapid detection, identification and neutralisation of biological and chemical warfare agents antidotes and antitoxins for use against venoms, microbial toxins, and aerosol sprays of toxic biological agents development of genetically-modified organisms development of bioweapons with either incapacitating or lethal characteristics development of poisons e.g. ricin, and contagious elements e.g. viruses, bacteria development of antianimal agents e.g. rabbit calcivirus disease (RCD) to curb overpopulation growth of rabbits in Australia and New Zealand development of antiplant contagious agents e.g. causative agents of rust, smut, etc.

Bioweapons

Bioweapons are characterised by a dual-use dilemma. On a lower scale, a bioweapons production facility is a virtual routine run-of-the-mill microbiological laboratory. Research with a microbial discovery in pathology and epidemiology, resulting in the development of a vaccine to combat and control the outbreak of disease could be intentionally used with the aid of genetic engineering techniques to produce vaccine-resistant strains for terroristic or warfare purposes. The best known example, reported by UNSCOM (Table 3), is the masquerading of an
anthrax-weapon production facility as a routine civil biotechnological laboratory at Al Hakam. In summary the dual-use dilemma is inherent in the inability to distinctively define between offence- and defence-oriented research and development work concerning infectious diseases and toxins. Whilst progress in immunology, medicine, and the conservation of human power resources are dependent on research on the very same agents of infectious diseases, bans and non-proliferation treaties are associated with the research and production of offensive bioweapons.

Genetic engineering and information are increasingly open to misuse in the development and improvement of infective agents as bioweapons. Such misuse could be envisaged in the development of antibiotic-resistant microorganisms, and in the enhanced invasiveness and pathogenicity of commensals. Resistance to new and potent antibiotics constitutes a weak point in the bio-based arsenal designed to protect urban and rural populations against lethal bioweapons. An attack with bioweapons using antibiotic-resistant strains could initiate the occurrence and spread of communicable diseases, such as anthrax and plague, on either an endemic or epidemic scale.

The evolution of chemical and biological weapons is broadly categorised into four phases. World War I saw the introduction of the first phase, in which gaseous chemicals like chlorine and phosgene were used in Ypres. The second phase ushered in the era of the use of nerve agents e.g.
tabun, a cholinesterase inhibitor, and the beginnings of the anthrax and the plague bombs in World War II. The Vietnam War in 1970 constituted the third phase which was characterised by the use of lethal chemical agents e.g. Agent Orange, a mix of herbicides stimulating hormonal function resulting in defoliation and crop destruction. This phase included also the use of the new group of Novichok and mid-spectrum agents that possess the characteristics of chemical and biological agents such as auxins, bioregulators, and physiologically active compounds. Concern has been expressed in regard to the handling and disposal of these mid-spectrum agents by "chemobio" experts rather than by biologists (Henderson, 1999).

The fourth phase coincides with the era of the biotechnological revolution and the use of genetic engineering. Gene-designed organisms can be used to produce a wide variety of potential bioweapons such as:

organisms functioning as microscopic factories producing a toxin, venom or bioregulator organisms with enhanced aerosol and environmental stability organisms resistant to antibiotics, routine vaccines, and therapeutics organisms with altered immunologic profiles that do not match known identification and diagnostic indices organisms that escape detection by antibody-based sensor systems
Public attention and concerns, in recent times, have been focused on the dangers of nuclear, biological and chemical-based terrorist threats (Nye, Jr. and Woolsey, 1997). This concern is valid given the significant differences between the speed at which an attack results in illness and in which a medical intervention is made, the distribution of affected persons, the nature of the first response, detection of the release site of the weapon used, decontamination of the environment, and post-care of patients and victims. Pollution and alteration of natural environments occurs with the passage of time, as a consequence of reliance on conventional processes such as dumping of chemical munitions in the oceans; disposal of chemical and biological weapons through open-pit burning; and in-depth burial in soil in concrete containers or metallic coffins (Miller, 1999). Incineration, seemingly the preferred method in the destruction and disposal of chemical weapons, is in the near future likely to be replaced by micro-organisms. Laboratory-scale experimentation has shown that blistering agents, such as mustard mixtures e.g. lewisite and adamsite, and nerve agents e.g. tabun, sarin and saman are susceptible to the enzymatic action of Pseudomonas diminuta, Alteromonas haloplanktis, and Alcaligenes xylosoxidans. In disposing of the chemical weapon stockpile of diverse blister and nerve agents, research now focuses on several microbial processes that are environment-friendly and inexpensive in preference to costly conventional chemical processes in inactivating dangerous chemical agents, and degrading further their residues (Mulcahy and Baining, 1990).
Chemical weapons are intended to kill, seriously injure or incapacitate living systems. Choking agents such as phosgene cause death; blood agents such as cyanide-based compounds are more lethal than choking agents; and nerve agents such as sarin and tabun are still more lethal than blood agents.

The use of bioweapons is dependent upon several stages. These involve research, development and demonstration programmes, large-scale production of the invasive agent, devising and testing of efficiency of appropriate delivery systems, and maintenance of lethal and pathogenic properties during delivery, storage and stockpiling. Projectile weapons in the form of a minuscule pellet containing ricin, a plant-derived toxin are ingenuously delivered through the spike of an umbrella. Well known examples of the use of such a delivery system are the targeted deaths of foreign nationals that occurred in London and Paris in the autumn of 1978.

Small-pox virus has long been used as a lethal weapon in biological warfare. The decimation of the American Indian population in 1763 is attributed to the wide distribution by the invading powers of blankets of smallpox patients as gifts (Harris and Paxman, 1982). More recently, WHO after a 23-year campaign declared the eradication of smallpox world-wide in 1980. A landmark date of June 1999, had been set in 1996, for the destruction of the remaining stocks of smallpox virus that were being maintained in Atlanta.
virus that were being maintained in Atlanta, Georgia, USA, and Koltsovo, Siberia, Russia. Current issues, however, such as the emergence of immunosuppressed populations resulting from xenotransplantation and cancer chemotherapy, loss of biodiversity, and the re-emergence of old diseases have necessitated a re-evaluation of the decision to destroy "a key protective resource".

Fundamental research and field tests continue to focus on determining the minimum infective dose of the biological agent required to decimate targeted populations, the time period involved to cause disease instantaneously or over a long period of time, and the exploitation of the entry mechanisms such as inhalation, ingestion, use of vectors, and the contamination of natural water supplies and food stocks.

The institution of food insecurity is a subtle form of economic and surrogate biological warfare. Conflicts over shared water resources in some regions of the world are commonplace. Human health, food security and the management of the environment are continuously being threatened, regionally and globally, by dwindling reserves of water (Serageldin, 1999). Within the framework of a real world perspective of biotechnology and food security for the 21st century, soil erosion, salinisation, overcultivation and waterlogging are other constituents (Vasil, 1998). Deliberately contaminated food containing herbicide, pesticide or heavy metal residues, and use of land for crops for production of luxurious ornamental plants and cut flowers, is another constituent of food insecurity. Applied now and emerging plant
insecurity. Again, new and emerging plant diseases affect food security and agricultural sustainability, which in turn aggravate malnutrition and render human beings more susceptible to re-emerging human diseases (DaSilva and Iaccarino, 1999). The deliberate release of harmful and pathogenic organisms, that kill cash crops and destroy the reserves of an enemy, constitutes an awesome weapon of biological warfare and bioterrorism (Rogers et al, 1999).

Anticrop warfare, involving biological agents and herbicides, results in debilitating famines, severe malnutrition, decimation of agriculture-based economies, and food insecurity. Several instances using late blight of potatoes, anthrax, yellow and black wheat rusts and insect infestations with the Colorado beetle, the rapeseed beetle, and the corn beetle in World Wars I and II have been documented. Defoliants in the Vietnam War have been widely used as agents of anticrop warfare. Cash crops that have been targeted in anticrop warfare are sweet potatoes, soybeans, sugar beets, cotton, wheat, and rice. The agents used to cause economic losses with the latter two foreign-exchange earnings were Puccinia graminis tritici and Piricularia oryzae respectively. Wheat smut, caused by the fungus Tilletia caries or T. foetida has been used as a biowarfare weapon (Whitby and Rogers, 1997). The use of such warfare focuses on the destruction of national economies benefitting from export earnings of wheat - an important cereal cash crop in the Gulf region. In addition, the personal health and safety of the harvesters is also endangered by the flammable
trimethylamine gas produced by the pathogen. Species of the fungus Fusarium have been used as a source of the mycotoxin warfare in Southeast and Central Asia.

Foodborne pathogens are estimated to be responsible for some 6.5 to 33 million cases on human illnesses and up to 9000 deaths in the USA per annum (Buzby et al, 1996). The costs of human illnesses attributed to foodborne causes are between US$2.9 and 6.7 billion, and are attributed to six bacterial pathogens—Salmonella typhosa, Campylobacter jejuni, Escherichia coli 0157H7, Listeria monocytogenes, Staphylococcus aureus and Clostridium perfringens found in animal products. Consequently, there is the dangerous risk that such organisms could be used in biological warfare and bioterrorism given that Salmonella, Campylobacter and Listeria have been encountered in outbreaks of foodborne infections, and that cases of food poisoning have been caused by Clostridium, Escherichia and Staphylococcus.

Bacterial and fungal diseases are significant factors in economic losses of vegetable and fruit exports. Viral diseases, transmitted by the white fly Bemisia tabaci are responsible for severe economic losses resulting from damage to melons, potatoes, tomatoes and aubergines. The pest, first encountered in the mid-1970s in the English-speaking Caribbean region has contributed to estimated losses of US$50 million p.a in the Dominican Republic. Economic losses
resulting from infestation of over 125 plant species, inclusive of food crops, fruits, vegetables and ornamental plants have been severe in St. Lucia, St. Kitts and Nevis, St. Vincent and the Grenadines, Trinidad and Tobago, and the Windward Islands. In Grenada, crop losses in the mid-1990s were estimated at US$50 million following an attack by Maconellicoccus hirsutus, the Hibiscus Mealy Bug. (Kadlec, 1995) has explained how "the existence of natural occurring or endemic agricultural pests or diseases and outbreaks permits an adversary to use biological warfare with plausible denial" and has drawn attention to several imaginative possibilities.

The interaction of biological warfare, genetic engineering and biodiversity is of crucial significance to the industrialised and non-industrialised societies. Developing countries that possess a rich biodiversity of cash crops have a better chance of weathering anticrop warfare. On the other hand, the food security of the industrialised societies, especially in the Northern Hemisphere, is imperilled by their reliance on one or two varieties of their major food crops. The use of genetic engineering, whilst enhancing crop yields and food security, could result in more effective anticrop weapons using gene-modified pathogens that are herbicide-resistant, and non-susceptible to antibiotics. Threats to human health exist with the biocontrol and bioremediation agent Burkholderia cepacia during agricultural and aquacultural use (Holmes et al, 1998). Attention has also been drawn to the new and potential threats arising from the use of artificial pathogens.
threats arising from the uncontrolled release or genetically modified organisms (Av-Gay, 1999).

Another aspect of biological warfare involves the corruption of the youth of tomorrow - the bastion of a nation's human power with cocaine, heroin and marijuana derived from drug and narcotic plantations reared by conventional and/or genetically engineered agriculture. On the other hand, the eradication of such drugs plant crops through infection with plant pathogens could prove counterproductive in yielding more knowledge and skills to wipe out food crops, and animal-based agriculture.

Bioterrorism

Popular scenarios of bioterrorism, that may have some mythical origins and cinematic Hollywoodian links, include the use of psychotic substances to contaminate food; the use of toxins and poisons in political assassinations; raids with crude biological cloud bombs; use of dried viral preparations in spray powders; and low-flying cruise missiles adding destruction and havoc with genetically-engineered micro-organisms.

Public awareness of the growing threat of bioterrorism in the USA is gathering momentum (Henderson, 1999). Development of national preparedness and an emergency response focus in essence, on the co-ordination of on-site treatment of the incapacitated and wounded, on-spot decontamination of the affected environment, detection of the type and character of the biological agent, and its immediate isolation and
neutralisation. The rise of bioterrorism as a priority item on the agendas of international concern and co-operation is now being reflected in the establishment of verification procedures to guard against contravention of the Biological and Toxin Weapons Convention, and in efforts in institutionalising a desirable and much needed state of preparedness. In the USA, there has been a boost in funding for such research and defensive measures (Marshall, 1999). International workshops and seminars focus on the peaceful use of biotechnology and the Convention on Biological Weapons (Table 3). In addition several other measures are in force to monitor the development and use of bioweapons (Pearson, 1998). Data generated by the Human Genome Project helps in the use of genomic information to develop novel antibiotics and vaccines, to enhance national and civil defence systems to contain and counteract the use of biological agents in the manufacture of bioweapons, to minimise and eliminate susceptibilities of different peoples, cultural and ethnic groups to hitherto unfamiliar or unknown diseases such genomic research could fuel the production of ethnic or peoples' specific weapons.

Curators and conservationists of biological diversity, public health officials, and biosecurity personnel, developing emergency preparedness provide convincing arguments to continue to maintain live viral stocks for the preparation of new vaccines in guarding against the re-
new vaccines in guarding against the re-emergence of small-pox as a result of either accidental release or planned use in bioterrorism. The microbiological community, and especially culture collections have an important role to play in educating the public to contain unexpected and sudden outbreaks of diseases through minimising the easy acquisition of microbial cultures for use in bioterrorist threats. To offset the illegitimate use of microbial cultures, obtained through either fraudulent or genuine means, the microbiological community naturally occupies a central role in answering the challenges posed in the production of bioweapons. Biological agents may be obtained from culture collections providing microbial species for academic and research purposes; supply depots of commercial biologics; field samples and specimens; and application of genetic engineering protocols to enhance virulence (Atlas, 1998). An example is the acquisition by a laboratory technician, of the causative agent of bubonic plague through the routine mailing system. In addition to expanding and safeguarding the planet's microbial genetic heritage, certified microbiologists can contribute to the building up of the defences of peace through the development of educational and public health training programmes, and surveillance protocols in counteracting bioterrorism.

A recent survey of over 1400 research institutions, universities, medical colleges, and health science centres in the USA focused on research activities, production capabilities and containment facilities that may necessitate compliance declarations with
the protocols of the Biological and Toxin Weapons Convention (Weller et al, 1999). However, in the absence of a systematised infrastructure, the administrative, educational, economic and legal costs are burdensome and considerable. Compliance declarations and regimes are of direct consequence with institutions that are engaged in routine and genetically-engineered research with specialised groups of microbial pathogens and toxins; that possess high-level containment facilities and laboratories; that are engaged in the design and engineering of high-production capacity bioreactors with fermentation volumes of 100-litres and above; and that do contract research for government and industry with biological agents that could serve as potential triggers of biological warfare and bioterrorism (Weller et al, 1999).

In brief, the very skills and technologies that are used by industry to screen, process and manufacture drugs and vaccines could be used to develop bioweapons. Given the increasing risks to pertaining to the threats of bioterrorism and bioweapons, and the dilemma of dual-use technologies, site-verification of existing facilities and data assemblage and monitoring activities seem to be necessary. Nevertheless, despite bio-industrial concerns based on potential risks pertaining to loss of confidential biotechnological data and proprietary genetic holdings, compliance with the Biological and Toxin Weapons Convention is a must. The role of industry in designing apt verification measures is a crucial element in the strengthening of the convention.
(Department of Foreign Affairs and Trade, 1999). Doing so, as a fundamental and primary step, provides recognition of the utility of the Convention, and at the same time strengthens its importance and authority in the outright banning of the production, stockpiling and manufacture of undesirable bioweapons (Monath and Gordon, 1998). The practice of such investigations emphasises the growing need for the development of a verification protocol that deters and discourages violation of the Convention (Butler, 1997).

The necessity of producing and stockpiling the small-pox vaccine has been emphasised in testimony by the author of the Hot Zone and Cobra Event (Preston, 1998). These are entertainment scenarios about the outbreaks of the Ebola virus in the nearby surroundings of Washington, D.C., and a bioterroristic event in New York City respectively. The potential outbreak of an epidemic of the now eradicated small-pox, in a population that has not been vaccinated since the registration of the last known case in Somalia in 1977, is a human disaster waiting to happen and which can be contained and avoided well ahead in time.

Another aspect of bioterrorism is to disrupt agriculture, to decimate livestock, to contaminate the environment, and to seed food insecurity through intentional food poisoning and food infection. Concerns, recently, have been expressed about the possible outbreak of gastrointestinal anthrax in Badakhshan.
gastrointestinal anthrax in Bacthoroan, Afghanistan (Scott and Shea, 1999), and in the border areas neighbouring Tajikistan, following first reports of symptoms which are also common to cholera, gastrointestinal anthrax, plague, tularaemia and listeriosis.

Appropriate control measures in combating bio- and chemical terrorism, and the production of bioweapons would involve:

- Enactment of national laws that criminalize the production, stockpiling, transfer and use of chemo- and bioweapons
- Enactment of national laws that monitor the use of precursor chemicals that lend themselves to the development of chemical and bio-weapons
- Establishment of national and international databanks that monitor the traffic of precursor chemicals, their use in industry outreach programmes, and their licensed availability in national, regional and international markets
- Establishment and use of confirmatory protocols in the destruction and dispersal of outdated stockpiles, and chemical precursor components.

Incidents of bioterrorism in the last two decades, fortunately were rare. In the USA, the most publicised case is that of the deliberate contamination of salad bars in 1984, with Salmonella typhimurium, an intestinal pathogen. The bioterroristic act, carried out by members of the Rajnaashe cult in Oregon, was aimed at securing an electoral result by incapacitating voters lacking empathy with the cult’s preferential candidate (Torok and Tauxe, 1997).
outbreak of salmonellosis, and that of shigellosis (Kolavic and Kimura, 1997) are documented examples of bio-threats to public health. Reporting of such cases is often rare since credence is generally attributed to the more common occurrence of food infection or food intoxication rather than to the criminal, and intentional, contamination of food supplies and catering facilities.

In another well publicised case, the Japanese Aum Shinrikyo sect released the nerve agent sarin in a Tokyo subway in 1995 following failure to obtain the Ebola virus for weaponisation in 1992 from (then) Zaire, and inability thereafter to release anthrax spores from a building, and botulinum toxin from a vehicle.

Bioterroristic risks are minimised through effective responses built around the development of preventive and control measures to contain, control, minimise, and eradicate outbreaks of travel-related vaccine preventable diseases. Tropical medical practitioners, public health personnel, immunologists, microbiologists, and quarantine authorities have an important role to play in safeguarding against potential bioterrorism in the future through timely detection of hepatitis A and B, yellow fever, Japanese encephalitis, rabies, typhoid, anthrax, plague and meningitis. To counter possible bioterrorist attacks using stolen or illegally acquired stocks of the dreaded small-pox virus, the WHO has postponed the agreed upon destruction date of June 1999 to December, 2002. It is likely at that time, that yet
December, 2002. It is likely at that time, that yet another postponement may occur.

Control, monitoring and reporting systems

Reporting of outbreaks of disease, often attributed to natural causes, should always be taken seriously since such outbreaks often result from non-compliance with the prohibitions embodied in international conventions in force. Potential nosocomial transmission of biological warfare agents occurs through blood or body fluids (e.g. haemorrhagic fever and hepatitis viruses); drainages and secretions (e.g. anthrax, plague, smallpox); and respiratory droplets (e.g. influenza plague, smallpox). The obligatory notification and reporting of outbreaks of diseases in humans, animals and plants helps to contain and neutralise the threats of biological warfare and bioterrorism. Such practice, in accordance with existing health codes and complementary reporting systems (Table 3), helps to develop a reservoir of preparedness capacity.

The development of a response strategy and technology in monitoring the control of weapons is at the core of a state of preparedness in the USA (New York Academy of Sciences, 1998). Current anti-bioterrorism measures involve the devising of unconventional effective countermeasures to combat misuse of pathogens encountered either naturally or in a genetically modified state. Such a strategic response involves:

the use of bacterial RNA-based signatures and corresponding structural templates through which
all pathogens can be potentially identified through appropriate trial and error testing, and verification; development of a data base of virtual pathogenic molecules responding to the bacterial signature templates; development, evaluation and use of effective antibacterial molecules that eliminate pathogens but do not harm humans nor animals (Ecker and Griffey, 1998).

Guidelines and recommendations have been formulated for use by public health administrators and policy-makers, medical and para-clinical practitioners, and technology designers and engineers in developing civilian preparedness for terrorist attack (Institute of Medicine, 1999). Areas covered deal with rapid detection of biological and chemical agents, pre-incident analysis of the targeted area, protective clothing, and use of vaccines and pharmaceuticals in treatment and decontamination of mass casualties.

The lack of basic hygienic procedures accompanying the use of domestic and public health facilities in the discharge, and disposal of human wastes has contributed to a large extent of the state of unpreparedness in responding to obnoxious biological weapons. Furthermore, the indiscriminate use of chemotherapeutics, and the overuse of antibiotics, has contributed to a complacent sense of invincibility in confronting once easily eradicated causative agents of disease. (Henderson, 1999) in summarising important distinctions between chemical and biological terrorism emphasised the need for an
awareness and allocation of resources in devising appropriate responses to threats of bio- and chemoterrorism. Crucial elements of appropriate and timely responses are the renovation and modernisation of the public health infrastructure, the necessary networking of the para-clinical and specialised medical forces involving nurses, general health practitioners, epidemiologists, quarantine specialists and experts in communicable diseases. In brief, an appropriate optimal response constitutes a co-ordinated management of medical capability and restorative efforts backed up by supporting extension services.

Several examples of scientific societies, and of national, regional and global initiatives addressing the global threats of emerging infections and disease have been documented (DaSilva and Iaccarino, 1999). The African biotechnological community is aware of the need of safety considerations and risk assessment in the development and use of bioengineering microorganisms (Van der Meer et al, 1993). Activities in Uganda, Kenya, Zimbabwe, Tanzania, South Africa, and the Southern African Development Community (Angola, Botswana and Zimbabwe) constitute a revelation of regional academic capacity and competence in addressing issues formulating guidelines, and programming initiatives concerning food security, recombinant DNA biosafety guidelines, and environmental biosafety protocols.

Destruction and deterioration of the environment
is usually preceded by the emergence and spread of infectious diseases. In Southern Africa, beset by war-plagued conditions, migration of tribal populations and overnight development of nomadic villages, the loss of life and erosion of human resources results from the occurrence of AIDS, malaria, tuberculosis, meningitis and dysentery. Academic and affluent societies are often stricken by outbreaks of hamburger disease. The causative agent is a virulent commensal Escherichia coli.

AIDS in South Africa is likely to become a notifiable disease as a consequence of governmental concern in containing the widespread occurrence of the disease (Cherry, 1999). The Department of Industrial Health in Singapore, in fostering a favourable workplace environment, requires the reporting of an outbreak or occurrence of anthrax listed amongst 31 notifiable industrial diseases. The rare outbreak of encephalitis in Malaysia, more recently, reached alarming proportions of concern with severe economic and health implications for other Southeast Asian countries e.g. Laos and Vietnam, thus prompting the destruction of large numbers of the porcine population suspected of harbouring the virus.

The role of chemical protective clothing in the performance of military personnel in combat and surveillance situations has been reviewed (Krueger and Banderet, 1997). The performance and output of military and auxiliary personnel is severely affected following exposure to chemical
severely affected following exposure to chemical weapons using nerve agents and disabling chemicals. Interference with a loss of physiological functions such as loss of muscle control, paralysis of body movements, loss of memory, dermal discoloration, prolonged deterioration of vision, speech intelligibility, and the like result in loss of psychological confidence, and professional competence.

The development of chemical protective clothing incorporating chemical and biochemical protectants, such as hypochlorites, phenolics, soap waxes, and antidotes, helps offset psychological stress and trauma, and combat anxiety. Anti-biowarfare and anti-bioterrorism research has led to the development of rub-on polymer creams and anti-germ warfare lotions that provide protection also against the influenza virus (Dobson, 1999a,b). Chemical protection in the form of rubberised hoods and tunics, gloves, boots, and gas masks helps guard against tear gas agents, nerve agents and chemical irritants delivered either by aerosols or liquid sprays. Recently, the incorporation of antibiotics in routine textiles as anti-odour and anti-infection agents has been reported (Barthélémy, 1999).

Weapons of mass destruction, be they nuclear, chemical or biological in nature, constitute a threat to national security, and to regional and international co-operation (New York Academy of Sciences, 1998). Civilian and military vulnerability to biological weapons can be overcome by resorting to the development of biosensors, fast-reacting bio detection agents, advanced medical
reacting bio-detection agents, advanced medical diagnostics, and effective vaccination and immunisation programmes.

Bio-detection has been spurred on through the development of biorobots (Treindl, 1999). Mechanised insects with computerised artificial systems mimic through microchips or biochips certain biological processes such as neural networks that gather and process neural impulses that influence behavioural sensitivities to stress and dangerous responses to substances of biological and chemical origin. These micro-gadgets can carry out in a single operation tasks such as DNA processing, screening of blood samples, scans for the presence and identifications of disease genes, and monitoring of genetic cell activity normally carried out by several laboratory technicians.

Furthermore, the ability to incorporate such dual-use cyberinsects and biorobots in the potential weaponization of biological agents needs to be addressed and curbed. Biorobots of the household pest-the cockroach, Blaberus discoidalis, the desert ant- Cataglyphis, and the cricket- Gryllus bimaculatus are already the subject of in situ research. The cricket robot is being developed, in the USA, through academic research within the framework of the Defence Advanced Research Projects Agency (DARPA) robotics program. The main raison d’être of robobiology is the development of miniaturised models with biomechanised minds that could be used also in space biology exploration. Moreover, like humans and other living organisms, their life
like humans and other living systems, their life span is not limited by the deleterious effects of toxic chemicals and wastes.

To help the medical community save lives during and in the immediate aftermath of bioterrorist attack, DARPA has sponsored projects that rapidly identify pathogens for treatment either with a combination of antimicrobial substances or nannobombing with potent biosurfactant emulsions (Alper, 1999).

The development of advanced biological and medical technologies aim at saving the 30 to 50 per cent of lives that are traditionally lost in frontline battlefield areas, and, reducing drastically the 90 per cent combat deaths that occur in close combat prior to medical intervention. Such technologies involve the development and use of surgical robot hands, trauma care technology, and remote telededecontamination of biologically polluted environments.

Tissue-based biosensors provide reliable alerts and assessments of human health risks in counteracting bioterrorism and biowarfare. Comprised of multicellular assemblies, and wide-ranging antibody templates, such sensors detect and predict physiological consequences arising from biological agents that have not been fingerprinted nor identified at the molecular level. Alerts and assessments are made through the use of reporting molecules that express themselves through the phenomena of luminescence, fluorescence, etc. For example, the pigment bacteriorhodopsin obtained from the
bacteriorhodopsin obtained from the photosynthetic Halobacterium salinarum is used as a sensor for optical computing, artificial vision, and data storage. Defensive and deterrent technologies are being developed to afford maximum protection to civilian and military personnel; and to reduce to a minimum the fall-out damage resulting from bioweapons that use unconventional pathogen countermeasures, controlled biological systems and biomimetics in the defence against biowarfare and bioterrorism (Table 4 a, b, c).

DARPA's Unconventional Pathogen Countermeasures program focuses on the development of a powerful and effective deterrent force that limits, reduces and eliminates damage and spread out resulting from use of bioweapons. Such countermeasures focus on:

- Impeding and eliminating the invasive mechanisms of pathogens that facilitate their entry through inhalation, ingestion, and skin tissue
- Devising broad-spectrum medical protocols and treatments that are effective against a wide range of pathogenic organisms and their deleterious products
- Enhancement of external protection using polyvalent adhesion inhibitors in protective clothing, biomimetic pathogen neutralising materials, and personal environmental hygienic protection systems

A novel challenge for the biotechnological industry is the development of effective biological defence programmes based on novel fundamental
programmes based on novel fundamental research in biotechnology, genetics and information technology. Biosensor technology is the driving force in the development of biochips for the detection of

pesticides, allergens, and micro-organisms; gaseous pollutants e.g. ammonia, methane, hydrogen-sulphide, etc heavy metals, phosphate and nitrates in potable water biological and chemical pollutants in the dairy, food and beverage industries

using the tenets of reliability, selectivity, range of detection, reproducibility of results, and, standard indices of taxonomy, contamination and pollution. Biodefence programs are now being developed around the unique sensorimctor properties of biological entities. Bees, beetles, and other insects are being recruited as sentinel species in collecting real-time information about the presence of toxins or similar threats.

Biosensors, using fibre optic or electrochemical devices, have been developed for detecting micro-organisms in clinical, food technology, and military applications (King et al, 1999; Mulchandani et al, 1999). An immunosensor is used for the detection of Candida albicans (Muramatsu et al, 1986). Bacillus anthracis, and bacteria in culture are detected by optical sensors (Swenson, 1992). In addition, several systems have been developed in the USA to detect biological weapons. Generic and polyvalent immunosensors have been devised to detect
biological agents that cause metabolic damage and whose antigenic structure has been specifically genetically altered to avoid detection by antibody-based detection systems. Other biodetection systems functioning as early warning/alert systems involve the detection of biological particle densities by laser eyes and electronic noses with incorporated alarms. Emphasis in such systems is less on the identity of the biological agent, and more on the early warning aspect which constitutes an effective arm in counteracting the threat of bioterrorism in daily and routine peace time environments (Schutz et al, 1999).

Such electronic noses result from a combination of neural informational networks with either chemical or biological sensor arrays and miniaturised spectral meters. Compact, automated and portable, electronic noses offer inexpensive on-the-spot real-time analysis of toxic fuel and gas mixtures, and identification of toxic wastes, household gas, air quality, and body odours (Wu, 1999).

The goal of such programmes is to prevent unpleasant technological surprises arising from misuse of biological agents, chemicals, ethical pharmaceuticals, and obnoxious gases. The preparedness involves the intelligence monitoring of the capabilities, intentions, and resource materials of potential opponents, and terrorists.

In testimony to the U.S. Senate Public Health and Safety Committee, it was emphasised that:
a) the strategy of developing and producing dual purpose diagnostics, therapeutics, and vaccines that protects public health and defends against biological weapons

b) the control and elimination of infectious diseases through improved surveillance, early warning, communication and training networks, and

c) the availability of front line preparedness and response in responding to bioterrorism and biological warfare (ASM, 1999) are integral constitutive elements of a preparedness domestic capacity against bioterrorism (Preston, 1998).

Concluding remarks

Biological warfare can be used with impunity under the camouflage of natural outbreaks of disease to decimate human populations, and to destroy livestock and crops of economic significance.

Attempts to regulate the conduction of warfare and the development of weaponry using harmful substances such as poisons and poisoned weapons are enshrined in conventions drawn up with respect to the laws and customs on land (Table 1). These early instruments of war prevention measures, and eventual confidence-building and peace-building measures, have evolved from normal practices and characteristic usages established amongst, civilised peoples; from the basic laws of humanity; the tenets of long
established and widely accepted faiths, and the dictates of public conscience.

In that context, the conventions outline steps and measures to safeguard buildings and historic monuments dedicated to art, religion and science, and to clinics and hospitals housing the sick and wounded, provided they are not engaged in combat. Use of such personnel in experiments designed to enhance the lethality of weaponry containing harmful substances such as poisons, disabling chemicals and ethical pharmaceuticals is implicitly and strictly prohibited. In the history of the interactions between science, culture and peace, the term Unit 731 is associated with the demeaning of science and humanity, their values and ethics. The activities carried out by Unit 731 in World War II were prohibited as far back as 1907 (Table 1).

In neutralising the effects of biological agents and rendering them ineffectual for use as bioweapons, bioindustries are now concentrating on the development of a wide range of biotherapeutics - antibiotics and vaccines (Stephanov et al, 1996; Perrier, 1999; Russell, 1999; Zoon, 1999) through development of biologically-based defence science and technology programmes. Current bioweapons defence research is now focusing on developing biosensors containing specific antibodies to detect respiratory pathogens likely to be dispersed through sprays and air cooling systems. Also contract research centres around the use of biotechnologies to remediate environmental areas contaminated with heavy
The genetic screening of human diseases and drug discovery have been facilitated by research advances in the field of bioinformatics (Lehrach et al, 1997). The automated and computerised study of shared information in the genomic DNA of biological resources in tandem with digital processing and graphic computation techniques, offers a base for the development of devices for monitoring environmental degradation and development of biodefence programmes (Table 4 a, b, c). The aim of such research in developing sensors for the timely detection and neutralisation of biological weapons is reflected in "Sherlock Holmes’ dog that doesn't bark", i.e the silence of the sensor indicates the presence of a biological agent (Morse, 1998).

Development of national preparedness and emerging responses to biological agents, either in bioterroristic or combat situations, is dependent upon the rapidity of intervention by trained antiterroristic personnel comprised of microbiologists, doctors, hospital staff, psychologists, military or law-enforcing forces, and public health personnel. In this regard, the economic impact of a bioterroristic attack has recently been assessed (Kaufmann et al, 1997). Investing in public health surveillance helps enhance domestic preparedness in dealing with, bioterrorism, emerging diseases and foodborne infections.
The likelihood of genetically engineered microorganisms contributing to the emergence of new infections cannot be ignored. Public reaction to the introduction of genetically engineered crops into Europe, at this time, is accompanied by controversy and fears for environmental safety. The uncertainty accompanying the potential outbreaks of new scourges is another complicating factor. Increasing public awareness and understanding of safety issues and the release of genetically engineered organisms into the environment helps to overcome unsubstantiated fears and misconceptions, and to secure confidence through a state of preparedness. On such strategies, a ready and effective response exists to combat potential catastrophes and outbreaks of emerging diseases. The science and value of environmental safety evaluations constitute a right step in this direction (Käppeli and Auberson, 1997).

New threats from weapons of mass destruction continue to emerge as a result of the availability of technology and capacity to produce, world-wide, such weapons for use in terrorism and organised crime (Department of Defence, 1996). Novel and accessible technologies give rise to proliferation of such weapons that have implications for regional and global security and stability. In counteraction of such threats, and in securing the defence of peace, the need for leadership and example in devising preventive and protective responses has been emphasised through the need for training of civilian and non-civilian personnel, and their engagement in international
personnel, and their engagement in international co-operation. These responses emphasise the need for the reduction and elimination of bioterrorism threats through consultation, monitoring and verification procedures; and deterrence, through the constant availability and maintenance of a conventional law and order force that is well-versed in counterproliferation controls and preparedness protocols (American Society for Microbiology, 1999).

Adherence to the Biological and Toxin Weapons Convention, reinforced by confidence-building measures (United Nations, 1997) is indeed, an important and necessary step in reducing and eliminating the threats of biological warfare and bioterrorism (Tucker, 1999).

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**Weaponizing "bird flu"**

The new experiments show that man can weaponize H5N1 in a lab. Clever. The experiments also show that this may be easier in nature than thought. Frightening. Humanity is doing very little to prevent such 'natural' weaponization.

Most of the H5N1 virus circulates in poultry, fully under man's responsibility, not in the wild. Humans are responsible for the health of their poultry. This dangerous pathogen should be controlled at its animal source, in poultry. It's silly
to pour billions into biosecure labs and do very little to improve biosecurity in farms in developing countries.

Poultry is the fastest-growing sector in China. H5N1 appears endemic there. Similarly in other countries. They have few veterinarians and no or unenforced veterinary standards. This is not their problem, it's a problem for the rest of the world in whose interest it is to urgently improve the standards and stem the flood of pathogens like H5N1.

The more virus circulates in livestock (relatively speaking, very little virus is in the wild), the sooner the wrong chicken will meet the wrong pig. Or the wrong ferret. This, too, will be man-made weaponization because man could have controlled the virus at its source.

yes they should stop it!

yes they should stop it!

motorcycle parts - articles

Reply for Good

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biological resources in tandem with digital processing and graphic computation techniques, offers a base for the development of devices for monitoring environmental degradation and development of biodefence programmes (Table 4 a, b, c). The aim of such research in developing sensors for the timely detection and neutralisation of biological weapons ps3 jailbreak memory foam mattress toppers is reflected in "Sherlock Holmes' dog that doesn't bark", i.e the silence of the sensor indicates the fabric blinds presence of a biological agent (Morse, 1998).

The following links provide information about recognizing bioterrorism hazards. For more information about specific agents, see OSHA's Anthrax eTool and Botulism, Plague, Ricin, Smallpox, Tularemia, and Viral Hemorrhagic seslichat Fevers (VHF) Safety and Health Topics Pages. Bioterrorism Agents/Diseases. Centers for Disease Control (CDC). Provides an A-Z listing of biological agents with bioterrorist potential. Includes links to fact sheets for many of the agents.