

biological chemical terrorism

By Dave Duffy

More than 5,000 American civilians lay entombed in the World Trade Center wreckage and more than 20,000 are taking antibiotics to fight off anthrax. America wages war against terrorists with cells in 60 nations. The enemy is willing to die in order to kill us, and they may have access to biological and chemical weapons.

How much danger are we in? Can they really unleash plagues of genetically altered bacteria and viruses among us, for which there are no vaccinations or treatments? Will they

attack us with a nerve gas that can kill thousands of people in minutes?

No one has definite answers to these questions, but the military and the civilian medical establishment are both gearing up to treat biological and chemical casualties. The American Medical Association website (ama-assn.org) is packed with the latest information for physicians on how to treat biological and chemical patients.

But a lot of perspective is needed when trying to assess the actual danger we are in. It is not as great as the constant news coverage of anthrax, for example, would indicate. But it is *real*. In fact, one could argue that whoever first mailed anthrax through

the U.S. mail did us a favor as a nation, because at long last we are taking seriously a threat that has existed for years.

Perspective

First the perspective:

If America was at war with a sophisticated military power such as the former Soviet Union, we *could* be attacked along the frightening scenarios mentioned above. The Soviets had hundreds of tons of genetically altered anthrax that even their own vaccine appeared defenseless against, they had hundreds of tons of nerve gas that could kill thousands of people in minutes, and they had the missile means to deliver both to our

shore. In fact, Dr. Valdimir Paschenick, a defector from the secret Soviet biological warfare program of the 1980s, told Western intelligence that the Soviet's view of a possible World War III included biological and chemical-tipped missiles being lobbed into the United States.

But we have not been attacked by a sophisticated state; we have been attacked by terrorists who spend a lot of their time living in caves. Terrorists may be able to catch us by surprise and hijack planes and drive them into buildings, and they may be able to grow batches of anthrax bacteria and send them through the mail to kill a few unsuspecting people, but actually waging biological or chemical war on us is quite another matter.

Producing germs and being able to disseminate them widely among a civilian population requires hundreds of millions of dollars of research and a country with a large scientific infrastructure. Terrorists do not have that combination, nor do the third world countries who support terrorists and are reportedly attempting to develop biological weapons.

Iraq, for example, had the hundreds of millions of dollars and they made a concerted effort to develop anthrax, botulinum toxin, and other biological agents into weapons. They succeeded only in developing a liquid form of anthrax, which they put in the warheads of a few SCUD missiles but never used, because even Saddam Hussein realized they were totally ineffective as weapons.

The only countries to have succeeded in developing biological agents as weapons have been the former Soviet Union and the United States, and it is not at all clear just how effective those bioweapons would be if used.

Anthrax

Let's take anthrax as an example of just how difficult it is to turn a bacteria into a weapon. Anthrax is a good example because it is considered by

military analysts as one of the most promising bacterial candidates to be weaponized. It is relatively easy to grow, stable, and has a good ability to infect people. Cutaneous (through the skin) anthrax is 20% fatal if untreated, and untreated inhalation anthrax is 90% fatal.

Both the making of the bacteria and the delivering of it successfully to the intended target must be considered together because there is no point in making a germ unless you can deliver it to targets. Nature is full of terrifying bacteria and viruses, but they don't always reach humans.

Anthrax lives in the ground in rural areas and typically infects only grazing animals because they spend so much of their time with their noses in the ground. A few anthrax spores cannot create an infection in humans; it takes about 10,000 or more. Wool sorters often inhale small quantities of anthrax spores, but do not get infected.

To be used as a weapon, anthrax spores must be converted to a dry powder one to five microns in size so it can be inhaled. It usually attacks the lungs, but it can also enter the body through cuts or undercooked meat. In a bad year about 10,000 people worldwide get anthrax, usually from tainted meat in third world countries.

The dry powder is necessary so the anthrax can stay in the air to be inhaled. If wet it will simply fall to the ground. Creating the powder is technically very difficult, requiring washing the spores in large, expensive centrifuges, then drying it by spraying a mist into a vacuum. It's expensive, technically demanding, and requires a lot of sophisticated equipment with several PhDs guiding the process.

Once the powder is made and disseminated, presumably through some sort of sophisticated aerosol device (crop duster nozzles won't work) it still needs the help of wind to keep it

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from falling to the ground. If it falls to the ground it can't be inhaled. But the wind will also rapidly spread the powder too thin so most of the intended victims would not inhale enough to cause infection.

An aerosol attack with a large quantity of anthrax, which terrorists would probably not be able to do, may kill a few hundred people but not the hundreds of thousands some media people are suggesting. Opening an envelope full of the powder would be another matter. There may be millions of spores present so it would be easier to inhale the 10,000 or so necessary for infection to occur.

Once someone is infected, anthrax is also not contagious from human to human, and antibiotics are effective against it.

It is important to realize the difference between terrorists attacking us with biological weapons and being able to kill large numbers of people, and terrorists scaring the hell out of us by sending anthrax germs through the mail, or disseminating it in some other inept way, and killing a few unfortunate people. Mailed anthrax has a tremendous terrorizing effect, but that is probably the only effect the terrorists can achieve.

Even if the terrorists managed to somehow get hold of a quantity of the former Soviet Union's purported supply of genetically altered anthrax, against which there is no vaccine or antibiotic, they probably could not use it effectively except as a terror weapon. It does not spray well through nozzles, as bacteria likes to clump together and clog up the nozzles.

Some of the anthrax sent through the U.S. mail was contained in a powder, which may mean it came from the Soviet Union or the United States military anthrax stocks, since they are the only countries capable of making anthrax into a powder. The fact that the anthrax, when caught in time, apparently responded to antibiotics

tends to indicate it may have come from the U.S. stocks. But that's only my speculation.

Living with terrorists and other nuts who set about to infect us with disease may be something we must learn to live with, at least until these people realize they can't do a lot of damage and we become immune to the terror aspect of it.

While doing research for this article, I encountered a lot of information in the mass media that talked about the terrible lethality of a lot of these disease agents. For example, botulism toxin, which some countries are developing as an agent and which folks can encounter while eating improperly canned food, is pound for pound the most toxic substance on earth. It sounds scary, and it is meant to be for the sake of readership, but it really has no relevance when you are talking about weaponizing diseases. As I said before, Nature is full of horrifying diseases, but if they can't get to you easily who cares. When we can food, we do so under strict rules so as to guard against botulism, just as when we eat in restaurants we avoid those that operate under third world conditions. We are so used to being conscious of cleanliness in America to safeguard our health—unlike many third world countries where diseases often run rampant—that we forget Nature has many diseases and toxins all around us.

Influenza kills about 20,000 Americans in a typical year, but most of us manage to carry on our lives in spite of that terrifying fact. My own daughter has asthma so is in a high risk group for influenza, and she doesn't get a flu shot because it gives her the flu. So she is vulnerable, but both she and I do not walk around terrified. Life has its risks.

This is not the first time bungling terrorists will try to attack us with disease, and it won't be the last. As recently as 1984, the Bhagwan Shree

Rajneesh cult had a beef with local officials in The Dalles, Oregon. They grew salmonella typhimurium in a laboratory at their Oregon ranch and used it to contaminate salad bars in four local restaurants. No one died, but nearly 800 people became ill. The culprits were all jailed for a few years, then deported.

Smallpox

Now that we're feeling a little more secure against anthrax and bacteria, and a few other germs, there *is* something to worry about. It is viruses. Many are contagious through the air, or from human to human. In many cases, one infected person can infect 10 or 20 more very quickly, so infections can multiply rapidly.

One virus in particular is worrisome—smallpox. Smallpox is a very contagious virus that is fatal in 30% of cases. Most people my age (57) were vaccinated against smallpox when children, but vaccinations stopped in 1977 when the disease was eradicated. The World Health Organization decided that only two laboratories should possess the eradicated smallpox: one in the former Soviet Union and one in the United States.

The former Soviet Union is believed to have developed smallpox as a biological weapon in its secret biological weapons program of the 1980s. In 1992, amidst the economic ruins of what had been the Soviet Union, Boris Yeltsin admitted the existence of the secret program and promptly discontinued it. Some 60,000 scientists and technicians who had become expert at developing biological weapons during the 20-year existence of the secret program were thrown out of work. The fear is that some of them may have sold their expertise, or perhaps samples of the smallpox, to other nations who wanted to pursue biological warfare research.

The United States still has some smallpox vaccine (15 million doses), but it is at least 25 years old and we are not sure how viable it is. It could take two to three years to develop a new vaccine. As for my vaccination, it may still offer some protection against a smallpox strain that was not genetically altered, but it has most assuredly lost a lot of its effectiveness in the 50 odd years since I got it.

Compounding the concern is that the Soviets may have made a genetically altered smallpox. Dr. Ken Alibek, former deputy chief of Biopreparat, the civilian arm of the Soviet Union's secret biological weapons program, stated recently that the Soviets had been working to genetically alter the smallpox virus, and had explored combining it with Venezuelan equine encephalomyelitis and with the Ebola virus.

The entire thrust of the Soviets' biological warfare program, according to Dr. Alibek, was to develop agents "for which there was no prevention and no cure," which was in sharp contrast to the U.S. program which created vaccines and treatments for each agent studied.

The danger is that suicidal terrorists, if they were able to get hold of some of the smallpox, will infect themselves and walk among us in crowded cities. Once infected, people are contagious for 7 to 10 days. Even smallpox that has not been genetically altered is still a virus, and viruses do not respond to antibiotics.

The Soviet breakup

Since the ending of the Soviet Union's biological program, not all of their biological stocks have been accounted for. The Soviets amassed hundreds of tons of anthrax, smallpox, tularemia, botulinum toxin, and a host of other diseases and toxins. Have terrorists bought some from unemployed biowarfare scientists desperate for money?

Another concern is the way the Soviets disposed of their biological weapons. For example, in 1988 they secretly buried tons of supposedly deactivated anthrax spores on the remote island Vozrozhdeniye (Renaissance Island) in the Aral Sea in Uzbekistan, just north of Afghanistan. A subsequent ill-thought-out irrigation project has drained 75% of the water from the Aral Sea so that the island can now be reached by land.

The United States is working with Uzbekistan to secure the anthrax. Analysis has determined that 6 of the 11 burial sites on the island contain live anthrax spores. This island was also used by the Soviets to test other germ warfare agents, such as smallpox, tularemia, plague, Q-fever, typhus, brucellosis, glanders, Venezuelan Equine encephalitis, and botulism toxin. Uzbekistan is also home to former Soviet chemical weapons plants.

Chemical weapons

Chemical agents, including some nerve agents, are much easier to make than biological weapons, thus earning them the reputation as "the poor man's atom bomb." Iraq manufactured several nerve agents, which it used with deadly effect against Iranians in their 1980s war, and again against its own people, the Kurds, in 1988.

Chemical agents are particularly frightening because many of them can be made with chemicals that are readily available to terrorists. They can be made in a home laboratory, and many of them can be disseminated fairly easily.

The agents come in several varieties: **choking agents** like the chlorine and phosgene used in World War I; **vesicants (blister agents)**, like mustard and lewisite; **nerve agents**, which are closely related to the insecticides and pesticides we use around the house and garden; and **blood**

agents like cyanide, which is used in many manufacturing processes and is always being transported on our nation's highways.

The most deadly chemical agents are the nerve agents, which include VX, GF, soman, sarin, and tabun. They may also be the most likely choices as terrorist weapons. They are chemically similar to pesticides, and like pesticides they can be disseminated through spraying devices such as those on crop dusters.

Many of us are familiar with the Japanese cult, Aum Shinrikyo, which in 1995 released sarin gas, a nerve agent, in the Tokyo subway system, killing 12 people and injuring 5,500. The cult was also implicated in a sarin gas attack that occurred in 1994 in Matsumoto, Japan, killing 7 and injuring 200. The cult had produced an impure form of sarin that was not nearly as lethal as military grade. The same cult was unsuccessful at developing a successful biological agent, even though it had six laboratories and a budget of \$300 million.

Some nerve agents, such as VX, are at least 10 times more powerful than sarin, and it is known that some countries that are sympathetic to terrorists possess it. In the case of VX, a single drop on the skin can kill a person.

Nerve agents are acetylcholinesterase inhibitors and interfere with the nervous system's ability to control muscles, causing muscles to spasm. They are absorbed through the respiratory tract or skin, and symptoms include chest tightness, pinpoint pupils, shortness of breath, drooling, sweating, vomiting, stomach cramps, involuntary defecation and urination, and extreme muscle twitching and seizures. It is very nasty stuff.

In the Persian Gulf War, Hussein's possession of nerve agent, and his suspected possession of biological weapons, caused the U.S. to arm troops with chemical defense kits and immunize them against anthrax and botulinum toxin. The U.S. said he

never used the agent, but some veterans groups claim that Gulf War Illness (GWI) exhibits symptoms that are consistent with nerve agent poisoning.

Possible methods of delivery by terrorists would be to modify aircraft with tanks designed to spray the agent. Iraq was working to develop such a method in 1990, according to CIA reports. An aerosol system mounted on a remotely controlled Unmanned Aerial Vehicle (UAV) is another method.

The Aum Shinrikyo cult that attacked the Tokyo subway possessed a Russian helicopter and two radio-controlled drone aircraft that could have been modified to spray chemical agent over a city. The cult used exploding canisters to distribute their nerve agent in the subway system.

Tanks mounted under a car and crop dusters are obvious ways to deliver nerve agents. A crop dusting manual was found among the belongings of Zacarias Moussaoui, a material witness detained by the FBI as having links with the terrorists who destroyed the World Trade Center towers. Moussaoui had also sought to take flying lessons.

Most nerve agents tend to dissipate fairly quickly, but VX agent was designed to be sticky and so stays on a surface for a long time, making an area unusable. It is mainly absorbed through the skin, while other nerve agents are mainly absorbed through inhalation.

When I was attending CBR Warfare School in the Army 35 years ago, atropine injected into the thigh was the life saving antidote against nerve agent. That is still the antidote today, but rapid decontamination is also critical for survival. In many countries, military personnel carry an auto-injector containing atropine and pralidoxime chloride. Pretreatment to withstand an attack is also available to the military in the form of pills that lessen the effect of the nerve agent.

Recovery from nerve agent takes about two weeks, but long-term effects that include mental disorders are possible. As I said, this is very nasty stuff.

The "terror" aspect

During the Persian Gulf War in 1991, 39 Iraqi SCUD missiles reached Israel. Even though none carried the nerve agent anticipated, 230 Israelis were treated for atropine overdoses, and an additional 544 people were hospitalized for anxiety. Just the threat of attack by a biological or chemical agent is intimidating to civilian populations, and an actual attack with its ensuing panic has the potential to cause major disruptions in society.

During the Cold War we lived under the specter of sudden nuclear annihilation; now we live under the specter of imagined annihilation by germs we cannot see or smell, and chemicals that our enemy can make in the neighbor's bathtub.

At least 17 countries, some of whom sponsor terrorists, currently have biological and/or chemical weapons programs. They include Egypt, Iran, Iraq, Libya, Syria, Cuba, Vietnam, Laos, Bulgaria, India, North Korea, South Korea, Vietnam, Russia, China, Taiwan, and Israel.

There are hundreds of bacteria, viruses, and toxins that could be used to attack people, but the military has chosen to develop only a handful because of they meet criteria involving ease of production, stability, and ability to infect. They include anthrax, smallpox, plague, cholera, Venezuelan equine encephalitis, Q fever, brucellosis, tularemia, staphylococcal enterotoxins, ricin toxin, and botulinum toxin. There are also many harmful and deadly chemicals being developed.

Some American officials have long realized that the nerve agent attacks in Japan's subway could just as easily have occurred in any subway system

in America, and some analysts have been trying to warn us that a terrorist biological attack on America was just as possible. Few people listened to them until now.

America is in a new type of war with terrorists, with part of the battlefield on our own shore. They can certainly inflict casualties upon us by surreptitiously inserting diseases in American society, and by surreptitiously releasing chemical agents that can harm, even kill us. But they cannot do it with effectiveness, especially in light of a now alert America.

For the initial stages of this new type of warfare, there will be a learning curve. But this is not the Middle Ages when plagues of various sorts visited generation after generation and went unchecked. We now have the science to quickly ascertain any threat and to develop preventive measures.

The learning curve will involve some casualties but mostly anxiety because we won't know when or where or how the terrorists will strike. Our loyal ally Britain has lived with that anxiety for decades at the hands of IRA terrorists. Now we have even more in common with them. Δ

The history of Chemical & biological warfare

The Germans are given credit for introducing both chemical and biological weapons into modern warfare during World War I.

Modern chemical warfare began April 22, 1915 near Ypres, Belgium, when the Germans released 160 tons of chlorine gas from 6,000 pressurized cylinders into the wind blowing toward the Allies. The gas choked to death 5,000 Allied troops. They repeated the attack two days later.

The Germans introduced Phosgene, which was 10 times more deadly than the chlorine gas, in 1915, and mustard and cyanide later in the war. Before the war was over, both sides had released 113,000 tons of chemicals, killing 92,000 and wounding 1.2 million.

Modern biological warfare was introduced as an antianimal weapon in 1915 by an American-educated surgeon and German agent who grew anthrax and glanders in his Maryland home laboratory, then passed them on to another German agent who inoculated horses bound for the Allies.

After the war the combatant nations signed the Geneva protocol, which barred both gas and bacteriological warfare. During World War II, no combatant used chemical or biological agent on the battlefield, even though the Germans by then had developed nerve agents that were 15 to 100 times more potent than the World War I agents. (There is some evidence that the Japanese may have released plague-infected rats in China that killed several thousand civilians.)

Even though the agents were not used on World War II battlefields, the Germans did murder millions of civilians using Zyklon-B and other chemicals. Allied nations seized the German chemical weapons after the war and started their own programs. Most of the chemical weapons manufacturing plants were taken by the Russians to Volgograd.

In 1952, in England, during research on chemical agents being developed from insecticides, a new nerve agent many times more lethal than others was discovered. Codenamed VX, the United States took over the large-scale production of it from 1961 to 1968 in Dugway, Utah. In one accident at the plant, a cloud of the agent escaped and killed more than 6,000 nearby sheep.

In the 1960s and early 70s in Vietnam, chemical agents called "Agent Orange," "Agent Purple," "Agent Blue," and "Agent White" were used by the United States to defoliate the jungle surrounding the enemy, and unconfirmed human casualties were reported.

In 1969 President Nixon unilaterally discontinued America's biological weapons program and destroyed its stockpiles.

In 1972 the Biological Weapons Convention outlawed biological weapons, and in 1973 the Chemical Weapons Convention outlawed chemical weapons. The Soviets, however, continued to operate a secret biological weapons program employing 60,000 people.

In 1979 an accident at a secret Soviet biological plant in Sverdlovsk (now called Ekaterinburg), Russia, caused at least 66 people living downwind from the plant to die of inhalation anthrax. In 1992 Boris Yeltsin admitted the existence of the secret program and discontinued it.

During the 1970s there were allegations that chemical agents were used in Laos against the Hmong tribesman who had supported the United States during the Vietnam War.

During the Arab-Israeli War of 1973, no chemical agents were used but captured Egyptian soldiers carried an antidote to the nerve agent soman.

There were allegations in the late 1970s and 1980s that a biological agent, tentatively identified as a myco-

toxin produced from a fungi, was used in Kampuchea, Cambodia.

During the 1980s in Afghanistan, there were frequent allegations that the Soviets were using chemical agents against Afghan rebels.

Also during the 1980s, during the eight-year Iran-Iraq War, it was confirmed that two types of chemical agents, the blister agent mustard and the nerve agent tabun, had been used by Iraq against Iran. Many Iranians were evacuated to Europe for treatment.

In 1988 it was also confirmed that Iraq had used nerve agents, mustard, and cyanide against Kurdish civilians when they bombed the village of Halabja in northern Iraq.

Although the U.S. says Iraq did not use chemical agents in the Persian Gulf War against Coalition Forces, some attribute "Gulf War Illness" to the possible use of them.

The use of chemical and biological warfare goes way back in history: Hannibal hurled poisonous snakes onto ships at Eurymedon in 190 BC. In 1346 DeMussis, a Mongol, catapulted bodies infected with bubonic plague into Kaffa, a seaport on the Black Sea in Russia. The British gave New England Indians smallpox-infected blankets in 1763. Even in America's Civil War, there were incidents of selling smallpox-infected clothing to unsuspecting Union soldiers.

Historical occurrences are numerous: Water wells have been poisoned by leaving dead bodies in them, arrows were dipped in blood and manure and decomposing bodies, wine was tainted with leprosy patients' blood, and artillery shells were filled with the saliva of rabid dogs.

Hurling plague-infected bodies at the enemy was a tactic used more than once in history's wars, and plague is still considered by the military as a good candidate for a modern biological warfare agent. Δ