

Planning for Bioterrorism

Behavioral & Mental Health Responses
to Weapons of
Mass Destruction & Mass Disruption

Friday - Sunday
July 14 - July 16
2000



A Conference Sponsored by:
Center for the Study of Traumatic Stress
Department of Psychiatry
Uniformed Services University of the Health Sciences
and
Center for Mental Health Services
Substance Abuse & Mental Health Services Administration

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PSYCHE AT RISK, PSYCHE AS ARMOR IN BIODEFENSE

Joshua Lederberg

DR. URSANO: It is a pleasure to introduce Josh Lederberg. Josh is a distinguished scientist, Nobel Laureate, professor for all of his career, who has taught not only his students, but all of us, about how we can learn about the world of microbiology, and also about its dangers and risks, which has been his focus more recently. He has also been a distinguished member of the Department of Defense Science Board, and has been focused on this particular topic of bioterrorism and its risks to the Department of Defense community as well as to our nation now for a number of years.

DR. LEDERBERG: I do not have to remind you that this conference is primarily devoted to consequence management, and that is a very important arm of our response to the threats of biological attack, biological warfare (BW). I could not be more delighted than I am to see the expertise that is being brought to bear on the psychosocial aspects of these problems of consequence management which have to go hand-in-hand with all of the technical, medical, clinical support, vaccines, antibiotics, first responders, and the physical aspects of that management.

I have been very deeply involved in that side of the game, but as I look ahead and see what further technology is likely to bring to the fore, I look ahead 10 or 20 years about what our knowledge of pathogenic organisms of infectious disease are likely to bring forward to us, and I have a rather gloomy prospect of the balance between offensive and defensive capability. That has led me to try to put more and more attention to what more can we do to provide disincentives for individuals, states, small groups, the whole panoply, to contemplate, plan for, and implement the use of BW in the first place, because I think in the long run we are going to have to depend much more on these events not happening.

Consequence management is an important link in that chain. Without preparedness we are so vulnerable that it is almost a criminal temptation for anybody to go to the top of the tower and start shooting at people at random or the microbiological equivalent thereof. But even using optimistic projections of what good consequence management could accomplish in today's world with today's agents, you would be doing very well and you would be very, very pleased at the possibility of rescuing 90% of your potential victims. But when your potential victims number in large exponents of 10, you do not congratulate yourself that much because of the leakage of what you had not been able to contemplate is still a horrendous toll.

Getting BW to not happen is a very, very important part of the program and it goes hand-in-glove with the other issues. The defense can be organized along the lines indicated. There are any number of other taxonomies that might be brought to bear. They are all very closely interrelated to one another, but I am going to concentrate on issues, for my own discussion, raising questions. I have very few answers about the deterrence and prevention, what we might do to lessen the likelihood that there will be a biological attack.

The paradoxical historical datum is that there has not been a really significant BW attack in recent history. This is used by some as an argument that we need not make any fuss at all about the problem. If they have not done it, then why put in any effort to deal with it? I doubt if that is going to be very contentious in this particular community, but I will deal with that shortly. I do not adhere to that view, but I do respect the history, and believe it invites our attention to the possible reasons for that regime of nonuse. The immense disparity between the capability for mischief of a relatively accessible weapon and its actual exercise.

This is not unique to the BW arena. If you stop and think about it, there are many individuals who have access to things like tanker trucks full of gasoline that could really wreak havoc as well if they were really determined to flame out a large part of a city or a subway system, or kill a lot of people. And I guess no one has done quite that thing, although the bombing of the World Trade Towers would be at that comparable dimension. I am not suggesting that BW is unique in that disparity between the extreme mischief that individuals could deal with and were just hell-bent solely on destruction and what they have for the most part actually done in the past.

Part of the answer to the question is that mayhem and destruction are generally small parts of the spectrum of what even states or terrorist groups want to accomplish. They almost always have rational political purposes in mind and those purposes have more to do with coercion, some degree of retribution, some degree of warning, a large degree of fear, that could often be accomplished at much lower levels of destructiveness than I had just been remarking on.

But the world is changing, and I guess the downing of the aircraft at Lockerbie was the turning point in which mass mayhem did seem to become the order of the day for a narrow sector of actors who want to use force in an unregulated way that falls under the overall rubric of terrorism.

So, we ignore such contingencies at our peril. I want to concentrate on a few questions that this audience may be well qualified to help think through. I will lay out my agenda, I will telegraph all my punches, and then I can bring back just a few scattered observations for bits and pieces of the story and then invite your wisdom and commentary.

One question that is very much in my own mind is, can we mobilize rational planning for dealing with BW attack, without on the one hand panicking the public, and on the other inspiring the potential perpetrators? I worry a lot about the latter. I worry a lot that the very fuss that we are making in order to get changes in public policy, to get investment, to get public adherence, may also be accentuating, let's call it the attractiveness, the glamour, the potentials of damage in this arena, and I really deplore the way in which the media have been invited.

They do not do this all on their own, make hay at a kind of maximizing these sorts of events. It is not that they are lies. By and large, what they are saying are things that could happen. But who needs to drill that home to the minds of individuals who might be borderline to start with? You have not seen me taking part in "Nightline" and other media exercises of that kind. I have no objection to talking to smaller groups, people whom I have some trust in, even people whom I do not trust, who are part of an elite that needs to be persuaded that there are issues at mind. Some degree of that just can not be helped.

But I am making a psychosocial judgment about the degree of harm that could be elicited by that kind of ventilation and balance against the good, and I do not know if it is right or not. Many people tell me that I am wrong. The cat's already out of the bag and the information is readily available. There has already been so much talk. Once the movies have gotten into the game what more can you add to it? So, why are you worried Josh? Nobody is going to pay any attention to you anyhow even if you are in the public media. But this is among the kinds of issues I would like to have your own experience and background in dealing with behavioral problems to bring to bear.

More importantly, and I do not have a clear answer to it, can we understand the non-use regime, the historical paradox, well enough to help plan for its reinforcement, or at least to make sure we do not erode it. And here I will have one or two concrete suggestions to offer about it, at least not eroding it. And then a rather grim thought. What about the day after tomorrow? What will a biological weapons attack bring in its wake? And in particular, will it ignite a series of copycat efforts and other things that we could do beforehand to at least mitigate that possibility, once the boom has, in fact, been lowered. And I would have to be an enormous optimist to believe that that will not happen in some guise or another.

Besides consequence management, in the immediate sense of minimizing event-related casualties, what might then be done to discourage further conflagrations at a point where there might be a little doubt of requisite public investment, but what would be the wisest things to do at that point?

Here are the headings of my socio-political inquiry. One of them - I have touched on all of these already in some measure, but I would like to put some degree of system at this stage, because it is going to get very disorderly for lack of good ideas and lack of good content as we go along. There is an issue of persuading elites that there is a serious problem of ready access to BW on the part of amateurs, perhaps particularly in the Department of Defense, because it would mean bringing them to a mission that they are not accustomed to dealing with of civil support of attacks on the civil population in response to that level.

There has been substantial skepticism, but recently quite a turnaround, so today I would say there is not a unanimity but a very strong consensus, especially among medically-informed specialists who know what bugs can do, and know how easy to grow them, and have some sense about how easy it is to disseminate them, that we are now seeing a moderate degree of public investment. Perhaps the most important member of that elite who has been persuaded, is the President of the United States, always taking a very personal interest in these matters. He is dragging some members of his cabinet by the heels towards paying close attention. And there is some very strong leadership in this matter and that is embodied in what I am sure you are all aware of, the Presidential Decision Directive 62, which laid out the framework of what government organization might be like in trying to cope with these issues and did really put on a mandate to agencies not really accustomed to dealing with these kinds of issues. On the one hand, the Department of Health and Human Services, on the other the Department of Defense, and Department of Justice, since we are dealing with crimes, might have greater familiarity with the law enforcement aspects, but know nothing about disease and infectious agents, and bringing them together (see Figure 1). So I have a marvelous picture of Janet Reno embracing Donna Shalala and being congratulated by the President for them both joining the National Security Team.

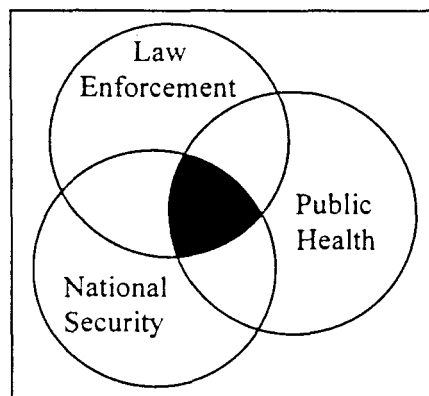


Figure 1. Organizational Framework for Biological Warfare

Most importantly is the issue of outlawing in the deepest sense of the term, even the thought of the use of biological weapons or just putting this so far outside the pale, that it is not contemplated as something that any human being will do. We know individuals who are so unsocialized or so anti-socialized that perhaps this is even more of an incentive than it is a deterrent, but the vast majority of people do operate with some framework of a sense of social order. They may not like the one that they are in. They may want to change it, but very few really want to see it collapse all together.

We have come a long way with respect to delegitimizing the use of biological weapons, particularly embodied in the treaties, the Biological Weapons Convention which does this at least rhetorically at the level of states. We have a modest amount of domestic law that deals with similar situations, and I will have more to say about that a little later on. In principal it is widely adhered to but we still have to organize our resolve in international forums to achieve effective enforcement. And the problems we have had at the U.N. Security Council in really getting the French and the Russians and the Chinese to go along with us in developing an effective regime of sanctions for Iraq and frustrating its very clear intentions of development of biological weaponry. It shows we have really got to go a long way.

But that is also connected with the fact that we are so strong we sometimes forget that we have to be smart. And we are using very blunt instruments, they are not as blunt as dropping bombs, but even economic sanctions that are devoted to the economic welfare of an entire people have had a backlash. They have it in the international forum and they have it in the domestic policy. I think one of the burdens that we are under, if we are going to have a reasonable world order, is that we have to find ways of enforcing that order that do not penalize entire peoples, that do not penalize the victims of tyrants even more than they are already subjected to and the fact that they are living in a tyranny in the first place. These are overlapping categories. We have the issue of discouraging proliferation. We do have sanctions on the one hand. Imperfectly elaborated, imperfectly enforced, and subject to the whims of what are regarded as myopic national security interests

This nation did something quite disgraceful and something very much against its own national security interest when it looked the other way at Iraq's use of chemical weaponry in Iran and against some people in the Kurds because at the moment we were leaning towards them. It need not have required very distant vision to understand how, in any long run, that would be very much to our disadvantage and it certainly has proven to be in spades. That is an example of the kinds of things that we need to scrupulously avoid if we are going to sustain this sort of regime that we are looking forward to of a more civilized kind of world. Connected with that, we as a nation, the most powerful nation, the one most deeply involved, the one who I think has the most to lose from the disorder that would accompany the habitual use of weapons like biological weapons, we, ourselves, have to come to the table with clean hands.

I have given you one illustration where our hands were more than a little bit dirty. I think we have present policy junctures to deal with that I will talk about a little more that are at least so ambiguous that they raise very serious questions as to whether we are

pursuing the right course or not. A very positive step would be to reinforce the sense that global health is a shared program, is a shared objective, that we will work with other countries and expend our own resources in order to enhance everyone's security against infectious disease no matter where they are. It is a disgrace that we have medications that are unaffordable to tens of millions of Africans who could profit from them.

I am not lambasting the pharmaceutical companies. They are operating in a mode that we have instructed them to, to make high-risk investments, achieve wonderful progress at the technical level. But we cannot let it stop there. We cannot let there be an impasse where a few billions of dollars could make such an enormous difference to the welfare of an entire continent. To the extent that we turn our backs on that kind of a situation, I think we are a little bit hypocritical in saying that biological weaponry is so awful because you are recruiting an infectious disease to an inhumane purpose, when we are not going all out in our own potentiality of countering infectious disease on a global basis.

Consider how much publicity should be given to the entire issue. I have already touched on the topic. And I am more concerned about inspiration than about information. Anyone who already has the idea that they want to produce biological weapons will have little difficulty, I am sad to say, in getting every nuance of information that they need and in capitalizing what are indirectly the fruits of our multi-billion dollar investments in offense BW between World War II and 1968 when we were in an arms race with the Soviet Union in the development of this kind of weaponry. They were not dramatic technological breakthroughs. They were not constructing new organisms, but they were discovering that these can be aerosolized, that aerosol routes of dissemination were very effective, for what might be otherwise very limited diseases, like anthrax; define the parameters for them; define the conditions for stabilization of those materials, their shelf life and so forth. All of that is available in the unclassified literature.

Now you kind of have to know how to look for it if you want to make the most effect, and you have to know what part of it to believe in order to make the most effective use of it. And that is where, what I would regard as overzealous dissemination of what are the most effective routes, what are the most effective media for producing and disseminating BW are not doing us very much good. I do not know how to censor it, but I think some modicum of restraint on the part of people like us who are trying to work towards solutions might be thought about. And I will have some more illustrations about that a little later on.

As I look ahead to what new technology has to bring to bear, and here is where I came into the story -- I was first recruited into BW policy to be a consultant to the Arms Control and Disarmament Agency in 1970 as an advisor to the U.S. Delegation of to the BW disarmament talks. One reason I was recruited is, that unlike a great many other scientists who were mounting protests against our offensive programs, development programs in both CW and BW, I felt the BW issue was so much more compelling for the reasons that what technology has to bring to bear, that it would be wise to carve that

out, make a separate issue of and I thought that we could much more successfully negotiate, as of 1970, a disarmament treaty that covered only BW than one that would also have to embrace chemicals as well.

The reason for that distinction is that chemicals had been part of the armamentarium of military organizations very actively since World War I. They played a very significant part, 10 to 15 percent of the artillery shell loadings in the last year and a half of World War I were chemical munitions, and while these were mostly disabling rather than lethal casualties, they did wreak one hell of a toll and they became part of the military doctrine of most states as a result of that experience. They were established and authenticated weapons, whereas that could not be said for BW. In fact, it was very difficult to try to define the circumstances under which the United States was likely ever to use biological weaponry. It is a niche that is well filled adequately by other kinds of weapons in terms of targeting, reliability, precision and so forth. A powerful and rich nation like ours does not need biological weapons in any way or fashion to accomplish its political or military goals. We have much else we can rely on.

The opposite can be said for the larger number of smaller and poorer countries, and especially sub-state groups, that do not have access to the missiles, precision-guided hardware, advanced aircraft, and even in some ultimate circumstance nuclear weapons. It is the poor man's retaliation or poor man's response to the high-tech weaponry that is the core of our military capability. It is very much to the United State's advantage as a powerful and as a status quo country to outlaw BW, and giving up our offense program was a tiny, tiny sacrifice to make in that direction.

The converse aspect of it would be the inevitable and eventual leakage of whatever technology was being advanced at our own laboratories. I have nothing but honor for the folks who were pursuing national objectives in working in those labs. Many of them I have known well. They were doing the job that had been assigned to them. It was a political decision, one that had to be conducted at a very, very high level, about what was in the best interest of this country. And we did very, very well to get out of that game.

But what about the new technology. How I came into this arena was that I was the inventor of many aspects of genetic manipulation and microorganisms, of the groundwork and how they could be used for the development of even more effective weapons. Effectiveness is often paradoxically moderating their effect, making them less contagious but making them more controllable, making them more amenable to certain protection of your own side and evading the countermeasures of the other side, rather than making them any more lethal than they already are. It is pretty hard to get past what is already on the table in terms of sheer lethality, in terms of sheer violence, but making them well-regulated military items is another story. And here the continuation of that arms race would certainly have been brought to bear the highest levels of technology for an ultimate purpose that would be very much to our national and global disadvantage.

But how can we regulate? Is it possible to even contemplate regulating that technology in the future when everything we do in the name of medical research, in the name of understanding pathogenesis, in the name of targeting new kinds of antibiotics and developing new kinds of vaccines overnight, that could be converted to quite nefarious use? I do not think there is an answer to that question, and it is still one more reason that I think we have got to try to deal with this problem as close to the roots as possible because what looms in the future is even more frightful than what we have on the table today.

And then a very practical kind of issue, how can we sustain effective intelligence, the penetration of terrorist groups, get into their heads, get into their planning? The FBI has actually done a remarkable job, not a very well-advertised matter of how much of this kind of planning they have already been able to get into. There may be one FBI agent for every terrorist in numerical terms, and it may take that in order to accomplish the goals involved. But, how can we proceed along these lines without an unacceptable intrusion into the ordinary course of the lives, the protection of our privacy, and so on. They are really quite serious dilemmas that have to be thought about, that also have their psychosocial component.

Now here is the good and the bad side. This is one of the more inflammatory official reports that has been issued in this field. I happen to have chaired -- Technology Assessment Advisory Council, an advisory group of this report of the OTA. And I tried very hard to get them to temper what they were going to put on public display. And they did cut out a lot of stuff that was even worse than what they had put in, in terms of technical detail.

But this was the most nearly authentic public document about what the potential scope of a BW attack would be. And it said that 100 kilograms of anthrax spores in a line source, across one boundary of Washington if the weather is right, the wind is right, and everything else is well prepared, could generate a million casualties. And one still has to accept that judgment. Now it is a best, best, best case from the point of view of the aggressor.

Innumerable things can and will go wrong with that scenario. So guess what? They will cut down the death yield by a factor of 10, maybe by a factor of 100. They will contemplate an attack where, when you have done the body count at the end of the month, you have had 10,000 victims, but you would have 5 million people exposed, and you do not really have a very good way of knowing which of those 5 million are going to end up in the 10,000 lethal casualties. By the time they are obviously symptomatic its essentially beyond our current modes of treatment. We need to do more research in how to treat anthrax later on in the day and since a lot of the disease has to do with shock syndromes and so forth, it is not totally impossible that we might get there.

But as things stand at the present moment, if you are, 24, 36 hours into the appearance of overt symptoms, essentially treatment is unavailable at that stage. So you have got a population not of 10,000 even though that is the limit of the accounting, you have got 5 million people that you have got to take care of -- well, that is the problem

that you folks are all facing at the very moment. It is at the far extreme, but it is a not-impossible scenario.

I think this was a pretty compelling argument. It did lead to Bill Cohen having a sack of sugar or flour throwing it up in the air and saying something, what it could do. I would have preferred if he said, yeah, but it is technically pretty tough and I am not going to tell you all the secrets of what would be needed to get the extra 20 DB of performance. I do not want this to be advertised as being too easy even though in the right hands it would be for reasons that were already gone into. But it was a pretty persuasive document, that said, yeah, there really is a problem and while you can knock it down on the basis of meteorology or did they really know how to make the aerosols, I am afraid we have been teaching them now to make the aerosols, is unfortunately part of the answer.

If BW is so effective, why has not it been used before? Until the last decade or so, theater was the main objective of almost every terrorist act. It was a demonstration. It was calling attention. It was eliciting sympathy. It had other purposes. It was a way of recruiting individuals who were at the margin. Once you get them to be involved in a criminal act, they are yours for life. We saw a great deal of that during periods of civil unrest during the Viet Nam War. A lot of the provocation for student violence was to recruit them for still more aggressive action by getting them involved in the first instance.

But massive casualties would have worked against their political objectives because they were trying to recruit sympathy for their cause and tried to divide their oppressors, invite overreaction on the part of law enforcement and the military and so forth. And if they are too aggressive, they subvert those kinds of angers. Well, I will not say we are past that. I think 90 percent of terrorist activity still belongs within that political ballpark, but we have too many events like Oklahoma City, like the World Trade Towers, to believe that there is always going to be that kind of restraint.

There are inherent technical thresholds in the use of BW. It does require a certain ease, if not knowledge, about dealing with microorganisms, and it is that ease which is part of the inspiration which is not yet so broadcast that anyone wanting to do violence is going to think of using BW in the first instance. But the more it is fictionalized and the more attention given to it, the more that barrier is reduced. I can give you recipes that you could perform in your kitchen, and you could find them on the web if you started looking for them.

The unfamiliarity with these weapons, the uncertainty about what the scope of their attack would be, the lack of prior experience, and also the fuzzy targeting. The World Trade Center Tower is a symbol, so it was not just trying to kill a lot of people, it was doing one at the center of the power of this country. It was part of that message. You send anthrax over Washington and you kill a lot of people from every walk of life and every socio-economic, racial, ethnic kind of group, and you have to be a totally unaffiliated individual to even want to think of doing that. To kill the Pentagon is one

thing, kill Washington is another, from the point of view of that mentality. So there are still barriers at that level.

During the Cold War a well-storied phenomenon, we were so preoccupied with maintaining the balance of terror between the super states on both sides, we were able to suppress a lot of more minor kinds of eruptions. They were not going to be allowed to start trouble that we did not want to be involved in at a larger level. That broke down in various circumstances, but it stabilized the world. You could not have had the Balkan Wars during the Cold War. We got them promptly when the Cold War faded away, and that sort of discipline then disappeared.

And there are cultural restraints. They are historical reality even if they are perplexing to understand why they were the case. This is language from the treaties. The Geneva Protocol, "Whereas the use in war of asphyxiating, poisonous or other gases, and of all analogous, liquids, materials or devices has been justly condemned by the general opinion of the civilized world, we agree also to extend this prohibition to the use of bacteriological methods of warfare." This was the echo of the Shrecklichkeit anti-German propaganda of World War I. The Germans could be pinned down with having introduced the use of gas warfare in the trenches, and they were not going to let them forget about it. One of the first things that was entailed in the treaty limitations, that even before there was a general disarmament treaty, was that Germany was not allowed the possession and development of these kinds of weapons.

More recently, in 1975, the Biological Weapons Convention, this is the exhortatory language. "Determined for the sake of all mankind to exclude completely the possibility of bacteriological agents and toxins being used as weapons, convinced that such use would be repugnant to the contents of mankind and no effort should be spared to minimize this risk." Well, you can believe it or not, but the language is there. It has been imported into international law. I think it has reached the status of customary law even beyond the signatories, I have no doubt, whatever, that officials of even a nonsignatory state would be likely to be hauled before a new Nuremberg court as having committed a war crime if they were to use biological weapons in the face of this kind of language. But, I will just put it down as a cultural display. At least the idea of this kind of abhorrence, of this kind of prohibition, has been well established in the rhetoric.

Now what do we have today that makes it different in terms of probabilities of use? The escalation of terrorist lethality I have already mentioned to you. I sadly have to comment that this reaches other walks of life and I am almost brought to tears to have to say this, but I think about Columbine High School and I think that there must be a thousand kids every year who are doing laboratory projects involving DNA splicing, PCR, genetic engineering of one kind of or another, the handling of microbes, who have access to laboratory facilities that will be quite adequate to the production, not of a thousand liters, but of a few liters, of serious infectious agents. And by the evidence of the Columbine and the abortive copycat efforts, we are dealing with a population, some anyway -- well, their hormones are raging. They are not very well socialized. They do not fully contemplate the consequence of things they do. And if you do not believe

what I said, think about all the hackers coming from that class of our humanity who enjoy showing what they can do to bring down the system.

So actually I have a pragmatic worry about that community, but I do not know what to do about it, except keep an eye open for aberrant behavior and do not support projects on growing anthrax for high school talent search. You may think that's a joke, but things very, very close to it do come by, and keep an eye out for what they are actually doing. And keep an eye out, this is a matter of school mental hygiene more generally for disturbance of a variety of other kinds, because kids could do a hell of a lot of damage. They are not going to kill Washington, but they may kill the school, or they may kill a good part of the city they happen to be in.

The splintering of regional and state authority and the upsurge of ethnic and religious fanaticism. This sector I worry about the most because there is a curve of experience, training, facilities, and funding that gets higher and higher the closer you get to state organized groups. But we also see a lot of splintering in those groups. Think about the Palestine Authority. We have Chairman Arafat who is trying to hold together a coalition, trying to conclude a peace treaty. But he cannot readily control every element of his own organization, and we have already seen a good deal of low-level terrorist violence whose objective is to torpedo the agreement. The rejectionists.

I worry that some element that might, in past years, have had state sponsorship, have had state funding, have had some training in the use of any of a variety of weapons have now splintered off and no longer want to follow the rules that their bosses lay down, because they have their own ideas on where to go. And we are seeing this kind of splintering in even the most tyrannical of states. We are seeing it in Iran today and somewhat more positive directions. I guess we are going to see that in North Korea as we find a government possibly moving to more pacific directions. But, as tyrannical as they seem to be when they are founded on fanatical ideologies, those ideologies may survive to more rational directions of political oversight.

The asymmetry of conventional military power is probably the largest driver. There are large incentives for states who know they cannot beat the U.S. on the battlefield of the kind that we define, who from their point of view may have no other recourse than the use of unconventional weaponry. With all of its limitations of targeting and so forth, BW is really the best shot they have. And then there is the diffusion of information, and it is only compounded by the Internet.

Now about this repugnance, I have a quotation, the cultural issue, from Vannevar Bush, a book he wrote shortly after the war. "Without a shadow of a doubt, there is something in man's makeup that causes him to hesitate, when at the point of bringing war to his enemy by poisoning him or his cattle and crops or spreading disease, even Hitler drew back from this. Whether it is because of some old taboo ingrained in the fiber of the race, the human race shrinks and draws back when the subject is broached. It always has, and it probably always will." I do not quote that because I believe it. I do not know what is ingrained in our fiber. I do know the history that we have talked about. That fiber may be a cultural fiber, I am more willing to believe it. But even as

strong as those remarks were, I have to say that there was certain, let's say, disingenuousness in those remarks. At the very time that Vannever Bush was writing these statements, he was also promoting the offensive BW program at Fort Detrick. So as persuasive or as passionate as those remarks are, they fell short of saying there should be a full dissociation, should not even think of even using these things in retaliation, which would be carrying the matter just one step further.

But that language is in the air, and whether you believe it or not, I would not just rely on it. I am not telling you folks to pack up and go home, you do not have to worry about consequence management, there will be nothing to manage.

There is something to grasp on to here, and I think we need to again examine, what it is we can do to reinforce these attitudes, these folkways, these mores, and not encourage their violation? I am trying to inquire what directions we can take. I think our most important media are probably physicians, health providers. Some of these are going to have the most obvious technical skills for the development of these kinds of weapons and their adoption. But they are also part of a world-wide community of discourse of information, of some commonly held ideals of service to humanity.

They played a large role in calling President Nixon's attention to the issues entailed in chemical and biological weaponry. Now this country is not quite like some of the others, but there could be communities of this sort. In France, in Germany, perhaps even in Russia, that have not been cultivated in any way, that we, as physicians, ought to be in closer contact with to try to make common cause. We do have. We have Ken Alibek who defected from the USSR by his own account because of his repugnance about what he was up to as a former biological warrior. He may have had other motives as well, but I think we should honor that one and ask, "How could behavior of his kind be further reinforced?"

We have taken some small way. We have cooperative threat reduction programs. We are investing a few million dollars here and there when we would have paid billions to neutralize these threats during the Cold War for converting old BW facilities into ones that could be oriented towards research and development for vaccine production. Trying to buy out some of the old BW warriors on that side.

It has taken years and years and years to get a tiny trickle of funds, but something is happening in that direction. So, these sentimental attitudes can be reinforced by other kinds of action. So here I am going to turn to something of the opposite. This was an advertisement that appeared in The New York Times about a month ago. It is from a Latvian physician who has a great deal of grievances, but he has picked up everything possible to organize anti-Russian propaganda. I think we might have a great deal of sympathy with his concerns about what is happening in Chechnya. Here is his ad. It is a call to arms - allowing the Russians to exterminate the Chechens and Latvians today may likewise lead to unknown consequences when biological weapons become a reality. Picture in the near future, a Chechen in a kitchen somewhere, growing something that can take out a big part of Moscow. Oh, you do not think he will use it? Do you really think they would pass on an equalizing weapon? I do not think so.

But what is remarkable is that The New York Times ran this ad! This level of discourse of "Let's use BW. Let's get back against our oppressors. They are killing us. Let's kill them by any means available," I am afraid it is going to be more and more of the tempo of the ethnic wars, grievances and so on, when indeed, there are massacres occurring when there is oppression, but the side effects of redressing evil on these parts, on what is happening in the rest of the world, I do not have to spell out for you.

This is from The New York Times last week, "Fusarium considered a tool to kill cocoa in Columbia." This is a plan which is quite far advanced and been pushed by a couple of congressman from Montana. There is a lab there that has been receiving research funding, some \$10 million dollars a year or so, to develop strains of a fungal, we will call Fusarium, that hopefully might be so specific for Erythroxyllum, the cocoa plant, that it might then be sprayed by helicopter (U.S. helicopters to be sure) over the plantations in Columbia and get rid of our cocoa problem.

This is being pushed at some very high levels, and I cannot think of a worse idea if we want to maintain a no BW regime in our deep-rooted thinking. I am not claiming it is an overt violation of the treaty. It is not an act of war. You will see how we have leveraged the Columbian government to assent to it. This is the Columbian Military Aid Act, and it is a condition to military assistance that the government of Columbia agree to the implementation of this program of microherbicide distribution.

My fear is that we will end up in the worst of all worlds. It will be deployed. There will be a big brouhaha during the process of it, but, you know, how can you be against the eradication of drugs? Well, it is not going to work. Nothing like this has ever worked to the level of efficacy. It will put a dent in it. It may kill half the crop or something of that order. So it will be marginally effective. A very high likelihood of collateral damage, that there will be other crops, maybe merely just by attribution, there will be wilt disease in other crops that might be attributed to collateral damage from this source.

Fusarium is not unknown as a human pathogen, and Fusarium toxins were what we worried about a lot and what was called "yellow rain" in the Southeast Asia as a source of trachothecene microtoxins. And we would have demonstrated enough efficacy, say, "You know, they did this to us." They meaning us, did this to them. What a cute idea. "Why don't we take out the cattle in the United States when we know how to do it." Just get past the customs barrier with a pound of contaminated meat where there has been foot-and-mouth-disease, and you have a \$5 billion dollar catastrophe overnight.

So, to inculcate an atmosphere which seems to legitimize the use of biological weaponry seems very much opposed to all the things that we are trying to preserve in the previous regime. I am just hoping that Mr. Clinton will take this under more serious advisement and get the level of interagency and interdisciplinary review.

I am astonished at how many people I have run into, in the intelligence community, in agriculture, and in the defense community -- who have not even heard about it, even when it has appeared in The New York Times. This is from another page of that OTA report, and this has to do with, how much do we have to blab about how to do these things? Do we really have to advertise the excipients that can be used to compound the stability of biological warfare?

It is just gratuitous, that these guys are showing off how much they have been able to get into the scientific foundations. You can accomplish the policy purposes of documents of this sort without going into this explicitly in detail. Now let us hope people mistrust the government, as they sometimes tend to do, and they will believe that this is misinformation. Unhappily that is not the case, and these are just some more recipes.

I am going to look now at new technology, and this does get kind of scary. The astonishing point is that this article was published. A young guy learning how to do biotech decides to do some genetic engineering with *Bacillus anthrax* in a Russian laboratory, to his credit it is a published article. And what does he do? He does something. He changes the whole complexion of what you might have in mind by engineering new pathogens. I attempted to pooh-pooh it on very good grounds that putting a pathogen together from whole cloth is a pretty tough thing to do. We do not even know the 50 or 100 genes that would be involved in converting your garden variety soil organism into being an effective pathogen. It has all kinds of adaptations it has to make to the human environment, knock down the defenses, etc. But that is not what he did. He took a professional pathogen, like anthrax and just put something else into it. What he did was import a toxin from another much less grievous *Bacillus* strain, some hemolysin from *Bacillus cereus*, so it is called cereolysine, with a very elementary bit of engineering, just taking a plasmid from one to another. Any high school kid can do that, and generate it, an anthrax that now has a second mode of action. The bad news is that this probably defeats the vaccine that we now have available. The so-called protective antigen protects against anthrax by knocking out -- its prime -- the entry of its prime and lethal toxin into target cells, and thereby disables it as a pathogen.

Give it another toxin, the anthrax is perfectly well able to grow in individuals who are immunized only against the protective antigen, but without the lethality our nonspecific defenses are of macrophages and so forth can take care of them. Put it in this new toxin, and at least in guinea pigs they can. Now this is far from having been tested to where it is a certain evasion of our vaccines. I would not abandon our vaccination program on the grounds of these experiments, but they show a pathway in which genetic engineering is quite likely the direction they are going to be taking - not generating more horrendous agents, but being the counter countermeasures against the specific defenses that we brought to bare.

So we think these are bad guys? Let us look at some good guys. Here is a report out of the Institute Pasteur in Paris. They had the idea that there was a whole family of new vaccines that could be made using attenuated strains of *Bacillus anthrax* as the platform for doing it. So they carried the technology of genetic engineering, a perfectly

legitimate, perfectly valid purpose one more notch. There is a how to do it implication of this that says, "You know, anthrax is going to be a very convenient organism to play all kinds of tricks with. These are for beneficial purposes." But you know, the message is out there. All kinds of other possibilities are in the offing.

My message is that the technology is only going to get worse. We cannot relent on the consequence management or the other diligence. We have got to have our fire trucks, we have to have our training, we have got to have the equipment. Fires of all sizes and kinds are going to be lit, and they are absolutely inevitable. It would be criminally irresponsible to leave ourselves open to any level of attack. But more and more sophisticated forms of attack are in the offing, simply as a by-product of a technology. We would not know how to stop if we wanted to. We could not stop because there are too many other gains, and we better get to the roots of the problem of trying to, say, "Why do we want to -- why does anyone want to see BW in the first place?" I do not know the answer to it, but I put that as an equally important question to the consequence management.

DR. WEISAETH: I raised the issue of genetic engineering in the last session. I think you have, in a way, answered my question. But I could have a follow-up. How far away do you think we or somebody is from producing a weapon that could be highly selective in terms of characteristics, of a population, for example, black or white or another skin color.

DR. LEDERBERG: Well, the examples that I would know how to build will protect minority groups because these are often like the Duffy Factor. The absence of this receptor protects West Africans from some forms of malaria. One could imagine constructing weapons that use that receptor in which the West Africans would be protected. Even at that they would be quite imperfect. What level of precision are you going to require? It is next to impossible to get better than about 90% as a 10:1 ratio of sensitivity of your target group compared to just about everybody else. Now you know, you can believe that there are infinite possibilities in genetic engineering, and you can even target particular individuals, but that, I think, really is in the realm of fantasy. Some rough and ready discrimination might be. The genetics of racial difference is so grossly misunderstood. Skin pigment, I believe, is a sexually-selected character. It originally was naturally selected. There might be some advantages in some environments. Yes, a dark-pigmented skin is great to protect your skin from aging prematurely in sunlight and so forth. But the way it has been maintained, it is an ethnic label. It is a group label. Aberrant individuals tend to be selected against because they are not like the norm of that particular group. It is a complex phenotype of half a dozen different genes involved, but it only goes skin-deep. If you try to look at the rest of the genotype, ethnic groups are so much more alike one another and there is so much more deviance within groups.

Around this table from individual-to-individual is a hundred times more genetic variation than there is in any ethnic group you are to name compared to any other one in terms of systematic difference. And I think that has simply not been generally understood. I do not put it as an overall impossibility, but when you contemplate, how

would you ever test a system of that sort, there would be no animal models for it to start with, I think it is pretty much fantasy. I think more likely you could find ways in which the different pattern of second-level immunity -- if you are a rice eater compared to being a weed eater. That would be a much more systematic difference among population groups. If you want to rely on selectivity I would use rifle bullets, or I would use geographical localization and not the genetic ethnic targeting.

DR. MARLOWE: I was struck by the analogy of a hacker. That is one I had thought of too. This leads to an issue that you opened, Dr. Lederberg, which is, how do we learn more about the conditions that produce people rather than nation states, that will use these kinds of things, these kinds of weapons, and not necessarily for traditional reasons? Americans have used biological warfare for quite some time now. They used it against the North American Indian with great success.

DR. LEDERBERG: I knew Lord Amherst did, I did not know about Americans doing it.

DR. MARLOWE: As we moved to the northwest frontier, a number of colonists did the same thing.

DR. LEDERBERG: I would be very anxious to see documentation of that.

DR. MARLOWE: It has also been done in South America. How do we start defining both the conditions and the kinds of motivations, leaving aside the religious fanatics and simple gain of people who will do this in terms of the way hackers have done it and in terms of the expression of power. I think this may be a very real problem.

DR. LEDERBERG: Maybe I am being a Pollyanna, but I think recruitment in a positive enterprise puts those energies in a constructive direction. So you know, be partners for global health and use your smarts in that direction. Show what you can do there.

DR. MARLOWE: Here I think of something like those two young men at Columbine and the world they got caught up in on the Internet, of the world of the Aryan nation, and like generation of fantasies.

DR. LEDERBERG: But, 30, 40 years ago even those kids in Columbine might have been boy scouts. We do not have that kind of organizational impetus to do positive things. If we had it once, what might we do to get it again?

DR. MARLOWE: At what time do we undo the 60's and 70's?

DR. LEDERBERG: Well, there is a piece of it. We gained a lot in individuality and we lost a lot in terms of trust. I do not have answers.

DR. BROMET: When you were talking about what we would call primary prevention, it was very interesting, and on one level it would be wonderful to believe

that that is where it is at. But on the other level, I started thinking about teenage suicide and the reminiscent discussion about, should we start programs in the high schools to prevent teenage suicide? We should not do that because we are going to give kids ideas that they might not have had before. The fact is, it is absolutely impossible to predict which kid is actually going to commit suicide. We know what the risk factors are, but they are not specific.

DR. LEDERBERG: But we have learned to pay attention when they start talking about it.

DR. BROMET: Yes, we have learned to pay attention when they start talking about it, but we cannot really identify which kid is likely to do such a thing to himself. So on the one hand it was very interesting to hear you talk about primary prevention, and on the other hand I was left feeling like, is that possible or should we really concentrate our efforts on secondary prevention?

You mentioned physicians. We had done some work with the Chernobyl accident, and actually it was partly the physicians who really fueled a lot of the psychosocial problems that happened afterwards. They did this in a couple of ways. One is they, themselves, believed either because they were told this officially by the government and/or because they firmly believed it because they are not the most educated people, that Chernobyl had caused all health problems that you could imagine, from heart disease to gastrointestinal disease.

DR. LEDERBERG: The world media did not and some of our green groups did that.

DR. BROMET: In data that I am going to show later, if you as an ordinary person had been told by a physician there that your health problem was due to Chernobyl, it had enormous consequences for your personal health.

DR. SHAW: What should our communication strategy be? There really is evidence in terms of dramatization of adolescent suicide in the media, that if you show a program on adolescent suicide, suicidal behaviors actually increase and as subsequent to that dramatization. It seems like you are really walking a tightrope in terms of awareness, education, and really as I think as you said, inspiring, kind of copycats.

DR. LEDERBERG: I will give you my personal communication strategy. That is, talk to groups that you think might undertake constructive action and be very low key in talking to everybody else. So I did go so far as to edit a theme issue of the Journal of the American Medical Association. That turned into a book. I think you have seen some readings of some contributions from the number of people here to that. Now that book will get in the hands of others, but I think if they are already so motivated they are going after a book like that, there is probably little more that would inspire them. At least that is my hypothesis. Also, stay away from the sensationalist media. You know, the sound bite, especially the imagery of video.

DR. SHAW: There are two issues with communication strategy. What do you do before the event? I come from Miami where we always predict bad hurricanes every year. Then, what should a communication strategy be once the event has happened? What do you really do to mitigate panic and terror subsequent to a happening? I think that is the major task of this group - issues of consequence management. What should our communication strategy be and how should we use the media?

DR. LEDERBERG: I think credibility is the most important element. You want to maintain a sufficient degree of civil order; that there is some chance of containing the situation, that people will stay in line to get their antibiotics instead of smashing down the windows or flee in panic when it is not appropriate, when fleeing would not do any good whatsoever, and so forth. But, they have to be able to hear from people that they then trust. So that means that you have to have people ready to talk straight, who will not mince words, who will not prevaricate; (if they do, they will be caught in lies) and have them ready in abundance and make sure you have the channels.

The TV stations have a contract where at least some of them can be taken over for broadcasting emergency messages. What I do not know is whether in the height of an emergency, you would have a TV channel available for official communications, so you do not have to depend on CNN - who will get there first, you understand that part of it, but the particular way in which they message it. I am not talking about shutting CNN up, but I am talking about having - if you want to hear what your government has to say about it, get it first hand, this is the place to go. Is that in place or not?

DR. LEHMANN: My comment relates to the work on suicide prevention in adolescents, but also speaks to the other issue about attitude. One approach to suicide prevention is not to keep secrets. If you know a person is at risk, share that with someone to try to get help. It is an attitudinal thing that focuses on the idea that the kid is keeping secrets from everybody else when the secret is going to be harmful. One of the things we have to look at here is the issue of attitudes and how we can influence people's attitudes towards being anti-biological warfare.

DR. LEDERBERG: And, at the same time, be very discreet about it.

DR. LEHMANN: Yes, but also recognizing things that actually can be done so we do not promote an attitude of helplessness, but rather can promote some rather basic ideas that may lead one to more helpful and adaptive coping.

DR. URSANO: I am sure many of you know, one of the most effective prevention campaigns was instituted in Australia that had to do with the occurrence of melanoma. What made it such a success was the phrase "slip, slap, slop" and I'm not sure I can get all three correct, but it is: "Slip on your hat, slap on your shirt, and slop on suntan lotion." This campaign, in fact, had dramatic effects in decreasing the incidence of melanoma. This is an issue of how and what to target in the question of primary prevention. Larry raises a new type of target in terms of community attitudes, which may not be specific to the question of bioterrorism, but more specific to mini-risk factors.

DR. SMITH: There are a couple of issues that may be a little misleading in that, if you are talking about bioterrorism, and you put it in the same category as natural physical phenomena, the hurricane, I think historically, you have a major difference in popular understanding of the implications of the phenomena. I do not know what you can do for the people who have gotten sick or are immediately exposed to getting sick in the city where an event has taken place. That is a primary response issue that many of you are much better prepared to handle than I am. I do see an issue with bioterrorism of other places, the city 500 miles away, or the town 50 miles away, where people understand once a hurricane or a tornado or an earthquake has happened, you are through. But, a biomedical phenomena has a ripple effect that is not understood, that is feared, and we can go back to the history of epidemics prior to the introduction of vaccines and antibiotics, and see that people's behavior becomes very antisocial. When they fear something they cannot see is going to come into their environment from somewhere else, and there is a psychosocial issue that somebody has to have preventive measures in place. We talk about authoritative information. In 1947 you had five cases of smallpox in New York City and everybody could explain where they came from, what needed to be done. Vaccines were made available, and you still had massive panic and police barricades and a need to mobilize the National Guard in order to simply get people who had been vaccinated to behave themselves. You may not have needed to, but they did it, and you have got big pictures of mobs coming to places. Now, they mostly behaved, they mostly were told, and things settled down, but there was a lot of immediate, immediate misinformation that was brought under control. But the issue is how you control that and how it moves to the next level. And that is different in biomedical history from physical/natural phenomena. People have different understandings of those kinds of issues.

DR. MARLOWE: I was going to bring up New York in 1947, because my recollection was that there was no panic. My entire high school simply marched up the block to 16th street in Lower Manhattan, Stuyvesant. We all lined up. We were all re-vaccinated, which was very much the story all over the city. Millions of people were re-vaccinated. The thing was that, (a) We had a far greater trust in government than exists today. It has been undermined terribly. But, (b) we knew that there was an effective, available way to cope with the situation. And, in terms of consequences, the thing I wonder about is, what is the offer? What is it that we are telling people we can do for them consequentially after the exposure?

The fear of the unknown, the lack of information, certainly we know from combat, is the most disorienting, demoralizing thing for people. What is it we are prepared to say, to do. How do we maintain psychosocial organization under these circumstances? And, I think this is something that requires attention.

DR. LEDERBERG: I will confess that I already graduated from Stuyvesant High School long since the time of the event, but I have been very interested in that circumstance and I have been trying to get, and I have not found, a detailed after-action report on it. Marcy Layton gave me a sheaf of clippings from the New York Times and their rather incomplete account and there was -- I think, one of Burton Ruachay's Annals of Epidemiology covered it to some degree, but it is such an important event. It is such a

precedent for what you hear, would have to cope with. I think it deserves very serious further study. What I have read may reflect Phase II on what was commented on. It certainly was brought under control.

I am impressed with how effective and how orderly that campaign was and it was from an epidemiological perspective as well. I think there were no more than a dozen cases total from that primary air contact. Now that was not a totally naïve herd. This is a population, a good fraction of whom had already been vaccinated before and so forth, so one has to take that into account. But, I would plead for a very careful restudy of that particular incident if the sources can be found.

DR. FLYNN: I would like to comment about the importance of credibility of those who communicate the messages. For a long time, I have felt that that was really the key, certainly a key, to consequence management in situations like this. My thinking recently has gotten a little more complicated, to make sure that we go beyond just making sure that the institutions, the individuals that are speaking, have the confidence of the people to an expanded concern that those people and anyone who speaks, knows what they are talking about. I am very concerned that we could have credible spokespeople in an area that is as complicated as this, saying either the wrong things or contradictory things, and, that credibility goes out the window. I lost confidence during the Midwest floods a few years ago. We did have credible representatives speaking to public health issues and the CDC, the State Health Department, local health departments, each said three different things when it came to the advice of, how long do you boil water before you can drink it? Now, if we cannot get three major, credible, governmental groups agreeing on that, how are we going to be sure that we are giving the people the right messages, even if we have the Surgeon General standing up and doing it, that has credibility. So, I think it is an issue of not just having the right people do it, but making sure that the right information and consistency of information happens, and that is even a bigger challenge, I think, than some of the others.

DR. LEDERBERG: You will not get that unless you have your strategy worked out well in advance as to who is going to take responsibility for what!

DR. CULPEPPER: At least they said to boil the water.

DR. RADKE: As I listen to the description of the rational planning and social-political strategy, it raises some skepticism in me because I have been living in the political world in the State of Minnesota as a mental health professional, and for the last five years, as a State Medical Director. What I have found is that society and the politicians are unresponsive until there is an incident. I do not know if that is complacency, blissful ignorance, or denial, but they are unresponsive. Then there is an incident. And, then what we have is an over-reaction, with a political solution, that does not make sense because it is neither rationally proactive, nor is it on target and it wastes a lot of time and resources. I am concerned that we face the same thing with something as important as responding to bioterrorism, and I was wondering about your thoughts on that.

DR. LEDERBERG: My approach to this has been Chinese water torture as a way of approaching political leadership. I have been working this beat for, as I mentioned before, about 30 years. First of all, I had to get professional consensus among other physicians and microbiologists, and so on, and that took a little while. That is where I have applied most of my own energies and efforts. There has been substantial response. If you just look at the kind of budgets that are going in, the funding for training and first responders that's -- there may not be an incident to which first responders will be responding to, but, I think it is an important part of overall training. We are lucky we have not had a major incident that got in ahead of our planning for it. But, I am feeling pretty optimistic about the way things are moving just for the moment. The organization of the government has been atrocious until fairly recently, but I think partly under the President's personal pressure in this regard, it is moving along.

I am sorry this group could not have had a chance to get a briefing by Bruce Lawlor. General Lawlor is in charge of Joint Forces Civil Support, a program that is starting to do staff work in the design of how federal government would be involved in the largest-scale incidents. They would only come in if they were dragged in by the requirements of the situation and the local civil authorities. But, it is a totally different world today than it was two years ago, from the point of view of the tangibility of the planning. I do not know if there are other efforts. It is more obvious to be able to see that at the Federal level and the DOD level. DHHS is just beginning to realize that there is an issue there and there are two or three people in the secretary's office and CDC - Scott is here so things have been moving. I do not know why you are feeling so discouraged.

DR. RADKE: I am reacting to the fact that on a federal level you see things happening, but on the State and local level we do not. I remember the incident on the Red River flooding where on two different stations at the same time, there were contradictory recommendations being made by authorities in place.

DR. LEDERBERG: Even if they are fairly minor issues, like how long to boil the water, it does undermine the credibility that they are offering people, if they cannot give the same story. I am not saying that there's not a long way to go, but I think at least the vector of movement is positive.

DR. HOLLOWAY: I wanted to make the point, which I suspect everyone here already knows, that this issue of getting the same message out is further complicated by what is considered good journalism. Because good journalism today means to show balance in reporting. A standard CNN reporter is going to have one person who says one thing and another person who says another thing, "on-one-hand," "on-the-other-hand," to prove that they are being fair. You ought to prepare for that in your overall strategy, because they are literally operating within the canons of their ethic when they do that. And so, you should not be surprised about that.

DR. LEDERBERG: I would still appeal for a place, a channel that says, "Now here this. This is Big Brother speaking. You may not like it, but Big Brother is all you've got

in terms of how to manage this situation and this is what we know and this is our plan." And, not have it filtered through the media.

DR. HOLLOWAY: I consider what I have just said an argument for your particular point of view about an official channel that provides official information and that this not fall under the usual requirements of reporting. I am both agreeing with you and suggesting that the situation will not go away because it is a requirement of the press to operate the other way.

DR. LEDERBERG: The reporters will snipe at it and, it will be ever thus, but there at least ought to be a place where you can know what the governor had said, what the Department of Health official had said, and hear it from their own voices and not filter through the reportorial mechanism that you indicated. Let the reporters snipe too, that is part of it.

DR. HOLLOWAY: But the discouraging part of that is that, when faced with something like Three Mile Island, the social response of the governor was to lie. This is the point where you have the situation where things can turn to disaster very rapidly with regard to the follow-up information. We need to inform those people who are going to be making those remarks that they need to be reporting what they do believe to be the truth.

DR. LEDERBERG: This is where exercises are all-important. I mean, these folks may operate according to their own practiced instincts or ones that are applied to other situations. Even that kind of an issue would come through during exercises.

DR. BARBERA: I want to go back to Brian's point and probably emphasize as much as I can, because it is nice to have a channel or an avenue of getting information out, but maintaining your credibility in the public arena, especially in something like bioterrorism, is going to be exceptionally difficult because medical and public health scientists are not the people usually conveying the messages to the public. When the messages are conveyed by the usuals, which are politicians, law enforcement, and emergency managers, they are often way off the mark. We see many other examples of this, like with Hurricane Andrew, when the governor said anyone with health and medical background that can help, please come and we deluge the state with some good people, some bad people, some outright frauds. We are going to have everyone deluged with experts that the media has found. In multiple venues that I have been involved with bioterrorism from the B'nai B'rith incident to a table-top exercise that was held for Janet Reno and Dick Clark to the recent Top-off bioterrorism where I helped to run the medical scenario. You get this information out there right away.

The idea of quarantine, which law enforcement seems to understand, or thinks they understand, and public officials. They immediately go to it. That alone will completely destroy public confidence immediately. In the bioterrorism event in Denver, quarantine was immediately invoked and we immediately shot back, "Okay, you have quarantined Denver and the Denver Internal Airport." You have just gotten a phone call from Colorado Springs Airport. They are overwhelmed with travelers who want to get

out and are going to get out, and they are flying out of there, or they have just overwhelmed the State of New Mexico with people going south to get out. The second we do any of those sort of things, the public officials are going to lose public confidence, and from there it's going to be a free for all. So, how do we connect the medical and scientific things? We have a lot to do way ahead of time to get this message out so it is scientific, so that it can fit all the different circumstances.

DR. LEDERBERG: That is what that exercise was all about, to be a part of that educational process.

DR. BARBERA: For those of us who believe in a systems approach to things, exercise is the last thing we do. First, you develop a system and then you train people in the system and then you exercise it to test it.

DR. LEDERBERG: That is when you think you know what you're doing!

DR. BARBERA: The problem is that you can predict all of this ahead of time. In the American psyches it is, "We had an exercise and we did okay, so what's the next problem? Let's move on." I am not sure that we are anywhere near where we need to be in terms of the systems.

DR. LEDERBERG: Does this group know about Top-Off. That something we might want to discuss.

DR. URSANO: We will have a chance to hear some more about that particularly in the panel session.

DR. WEISAETH: We have tried to study the credibility of various information sources during nuclear fallout. It started during the crisis in 1986, during the Chernobyl crisis, where Norway got more fallout than any other nation. Health personnel, health authorities came highest in trust. Now, we have no nuclear power plants, so the nuclear physicists, actually, were seen as very reliable sources of information. And, we have done this on some occasions since 1986. The problem we see is that the trust in local health authorities is low, and it is the same with the media. Local media have low credibility, while the national media, particularly Public Broadcasting, have very high credibility compared with the commercial channels. About 70% of the population, have a high trust in public authorities when it comes to information about the nuclear fallout. We did a study in Kola, where we were able to interview 2,000 Russians. The shocking finding was that 19% of them stated that they would believe information from their authorities about radiation level in the case of a nuclear accident. We also asked people, would you like to share the disagreement between experts? Approximately 50% said yes. We want them to wait until they can disagree and know with what they disagree on.

The young, urban, well-educated people have been immunized towards the information society. They can tolerate disagreements between experts. While the rural part of the population, the elderly, less, perhaps, educated, have this other attitude. The

main problem I see is that the radio will be the most important mass medium, because it will be on the spot and since, particularly with nuclear fallout, will be scattered, so if you give national information, some people will get the wrong type of information, while the local radio can sort of tailor-make its information to the people that are in our area. The main problem we see is the lack of expertise at the local health authority level and among the local mass media, and radio in particular, because it will be so important.

DR. ENGEL: I wanted to go back to Dr. Radke's comment that in situations like this there is a tendency to come up with do-everything solutions. We are a group of people who have a certain amount of expertise in this area. We may see some reward in it for us to recommend do-everything solutions. What I would hope that we would do, is something that has not been done enough in health care settings but is receiving increasing emphasis as the cost of health care goes up and there is a limited pool of resources. And that is, we focus on a couple of issues. One issue is that we are implementing things that we know will be effective. I realize there may be a shortage of those sorts of things in this particular instance, but we place a certain moral high-ground on focusing on things that we know we can do with some positive impact. Then, similarly, we focus on the feasibility or the cost of what it is that we do. That we also, for instance, as something becomes easier to do on a broad scale, that we are more prone to implement it, even if the body of evidence in support of its efficacy is less. We have to weigh the big social picture, which is, there are lots of concerns that communities have. There are lots of concerns that we all have, and we have to balance our enthusiasm for this particular issue with the realities and look to what we know will be effective, and on some level what we think can be feasibly implemented.

DR. URSANO: Josh has drawn our attention to some additional targets, and I do see a theme emerging about what are the targets for behavioral intervention. It may or may not be the good news for Robert and Brian because we are expanding their offices' task, but it is their tasks to figure out how to tell the Secretary. Because clearly, the targets include how to minimize or decrease inspiration, which is a substantial undertaking, as well as how to decrease the spread of familiarization and increasing comfort with biological weapons.

In addition, the issue of maintaining cultural constraints, which I think is a marvelous topic, and I should tell you all that we tried to get some legal representatives to attend the meeting and were not successful with that. Certainly, to mobilize rational response, which we have spoken about before, to return to Lars' comment, in particular, which summarizes the issue of our need to have and focus on both credible and knowledgeable communication, but to recognize how those terms are dependent, potentially, about what group is being spoken to and how it will vary by the group that is listening. And, we need to crank that into our equation as well.