A conversation with Amy Smithson on February 4, 2014

Participants

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Note: This set of notes was compiled by GiveWell and gives an overview of the major points made by Dr. Smithson.

Summary

GiveWell spoke with Dr. Smithson as part of its preliminary investigation of biological weapons nonproliferation issues. Conversation topics included the current US approach to bioweapons nonproliferation and promising approaches for a philanthropist to address these issues.

Background on Dr. Smithson's work

Dr. Smithson has been working on chemical and biological weapons nonproliferation for over two decades. Much of her work has been foundation-funded, including by Carnegie, Macarthur, the Nuclear Threat Initiative, and Ploughshares Fund, all of which, unfortunately, have since largely ceased supporting chemical and biological nonproliferation work.

The current US approach to bioweapons nonproliferation

The biological weapons nonproliferation regime is currently dependent largely on a top-down approach, namely on export controls via the Australia Group and the Biological and Toxin Weapons Convention, which bans the weapons but lacks verification provisions. Governments are accustomed to these traditional tools, but more creative initiatives are needed to fill the gaps and get other players proactively involved.

When it comes to preventing bioterrorism, the US approach relies heavily on the Select Agent Rule regulations. After Larry Wayne Harris, a white supremacist, used fake letterhead to obtain freeze-dried bubonic plague from the American Type Culture Collection in 1995, the US government issued a “select” list of agents to prevent unauthorized individuals from obtaining high-risk pathogens for illicit

purposes. The list centered on pathogens that state-level biological weapons programs had weaponized in the past. After the 2001 anthrax attacks, the US government lengthened the list of human and animal pathogens, added a list of plant pathogens, and strengthened the regulations to certify not just facilities, but to screen employees who would have access to select agents. This screening process asks whether individuals have been legally adjudicated "mentally deficient" but does not require or conduct current mental health or substance abuse screening. Consequently, the Select Agent Rules would not have caught or stopped Bruce Ivins, the anthrax-specialist from America's top biodefense facility at Ft. Detrick that the FBI identified as the perpetrator of the 2001 anthrax attacks. Ivins was mentally ill and abusing drugs and alcohol.

The Select Agent Rules, which emphasize inventory and access control of the listed pathogens, resemble approaches that are used successfully to identify, quantify, and control nuclear materials. For several reasons, this "guns, guards, and gates" approach is difficult to translate into the biological arena. First, the listed pathogens can be found in and isolated from nature. Second, pathogens not on the list can be genetically engineered to be more virulent or contagious. Soviet bioweaponeers engineered strains of anthrax and other pathogens to be resistant to known antibiotics and vaccines, and they increased the lethality of smallpox from just over 30% to over 90%. Finally, with advances in synthetic biology, scientists can now make pathogens from scratch. In 2003 and 2005, respectively, scientists brought the polio and the 1918 influenza viruses to life in the petri dish. The challenges of keeping a pinpoint inventory were further illustrated when, in 2009, Ft. Detrick announced that an investigation of an inventory discrepancy turned up 9,300 vials of pathogens that were not listed in its inventory, including Ebola, plague, anthrax, and botulism.

Other programs launched after the 2001 anthrax attacks and intended to enhance US defenses against a biological attack may be misinterpreted overseas. For instance, the US increased the number of biosafety level 4 (the highest level) laboratories from a handful to 15. This building boom and the huge increase in US biodefense expenditures to over $6½ billion in FY 2014 have led some countries to suspect publicly that the United States is cheating on prohibitions of the Biological Weapons Convention.

Need for bottom-up approaches to bioweapons nonproliferation

A concerted philanthropic effort is needed to start tackling the bioweapons proliferation problem not just from the top down, but from the bottom up. Two important areas of activity need to be energized. First, the private sector, which makes all manner of equipment, materials, and technology that governments, terrorist groups, and even so-called lone wolf actors could divert from legitimate, commercial uses to bioweapons programs. The private sector is now mostly in passive mode, complying with governmental regulations but not proactively using other constructive nonproliferation practices. Neither governments nor companies want to see the misuse of goods and services for terrorist or criminal purposes, so there are mutual public and private sector interests in collaborating on the problem of nonproliferation. Patriotism and humanitarian interests aside, corporations recognize that the percentage of sales to potential malevolent actors is miniscule in comparison to their overall business, which could be materially damaged by the revelation that a company's product was involved in a terrorist attack or criminal activity. Both the private and public sectors have assets that each can draw on to thwart proliferation, so the task lies in explaining the potential for nonproliferation collaboration to companies and introducing them to the best practices in use elsewhere in industry.

Second, while the overwhelming majority of life scientists are engaged in laudable work to combat diseases, raise agricultural productivity, clean up the environment, and generate energy, one cannot ignore the fact that historically, an unsettlingly large number of life scientists have plied their knowledge and skills to make weapons. The Soviet bioweapons program involved about 65,000 scientists and technicians. Having met hundreds of former bioweaponeers from various countries during the course of her career, Smithson said that, when asked, often they did not know that they were doing anything illegal. Some considered bioweapons work was fascinating science, while others appreciated that the deep pockets of the military gave them better equipped labs and higher salaries.

With these factors in mind, a second bottom-up strategy is to get scientists to consciously opt out of the bioweapons business. A small fraction of US colleges and universities offer life scientists brief instruction in their ethical and safety responsibilities–from the proper use and disposal of "sharps" and obligation not to

falsify data to the moral boundary of not making weapons from diseases. Even fewer US institutions of higher learning make passage of more substantial ethical and safety instruction a graduation requirement. The same is true elsewhere around the world. In an age when people are behaving in increasingly unconstrained and socially irresponsible ways, for example by shooting up schools and movie theaters, the notion that life scientists should be required to know what is against the law and the punishments for breaking the law seems common sense. So, just as pilots are taught that they cannot drink alcohol before flying, scientists need to be inculcated in their responsibilities to society while in the laboratory.

Furthermore, work needs to be done to start changing the culture in the laboratory, where often the competition to make the discovery, get the grant, or publish or perish causes scientists to look the other way when they observe a colleague engaging in questionable behavior. This *laissez faire* culture is particularly worrisome for scientists working with high-risk pathogens, where a scientist who has impaired judgment or is not properly trained might mishandle a pathogen and jeopardize the well-being of themselves, their fellow workers, and the public at large. Therefore, the laboratory culture needs to evolve from looking the other way to mutual responsibility, wherein all laboratory scientists help ensure their colleagues are fit and trained to handle pathogens in a safe and responsible manner.

The educational material already exists, but a considerable effort will be needed to get all of the educational, scientific, and professional associations aboard and to leverage colleges and universities to see that around the world, ethical and safety instruction for life scientists is the norm rather than the exception. To some, drilling ethical responsibilities into life scientists may not seem like it would make that much of a difference. To rebut that assumption, Smithson observes matter-of-factly that politicians and, often, military commanders lack the skills to make biological weapons. Scientists and technicians are the ones that do that, which is why it is so important to make sure they are part of the solution, not part of the problem.

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