

# CRS Report for Congress

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## **Terrorism: Background on Chemical, Biological, and Toxin Weapons and Options for Lessening Their Impact**

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# Terrorism: Background on Chemical, Biological, and Toxin Weapons and Options for Lessening Their Impact

## Summary

The catastrophic terrorist attack of September 11, 2001 and the subsequent anthrax mailings have sensitized the nation to acts of domestic terror. The confirmation of terrorist interest in weapons of mass destruction and the vulnerability of the United States to such attack have highlighted the potential that these weapons may be used as weapons of terror. The framework of weapons of mass destruction (WMD) includes chemical, biological, and toxin weapons.

Chemical, biological, and toxin weapons can produce mass casualties if effectively disseminated, but have varying and different effects. Chemical weapons, predominantly man-made chemicals, require the largest amounts of material to be effective and cause their effects in minutes to hours. Biological weapons made of naturally occurring pathogens require the least material to be effective, but generally have an incubation period of several days before symptoms show themselves. Toxin weapons, such as ricin, chemical agents formed by biological processes, are intermediate between the two in both amount and timescale. Treatment protocols for chemical, biological, and toxin weapons vary by agent, ranging from weapons with effective treatment and prophylaxis to weapons which have no known cure nor protection.

Chemical, biological, and toxin weapons pose additional concerns beyond mass casualties. These weapons may contaminate the area in which they are used, emergency vehicles, and first responders. The wide array of potential symptoms from chemical, biological, and toxin weapons makes identification of the causal agent difficult and complicates treatment. Additionally, public fears relating to disease and poisoning could increase the effect of a chemical, biological, or toxin attack, as worried, unexposed people request treatment from medical facilities. In extreme cases, public hysteria has been postulated as an outcome from mass dissemination.

Several initiatives are underway to reduce the potential value of chemical, biological, and toxin weapons. One approach has been through funding significant increases in the public health system's preparedness and response capacity. Additionally, facilities and researchers possessing "select agents" have been registered in a national database. Non-governmental agencies, such as the National Academy of Sciences, and professional societies have also been active in developing policies and options to lower the threat of terrorist attack.

Potential options to further decrease the odds of chemical, biological, and toxin terrorism include regulating and registering domestic purchase of "dual-use" equipment; further development of the public health system; federal incentives for research and development into chemical, biological, and toxin medicines, vaccines, countermeasures and detectors; informational public outreach programs to properly inform the public about the risks involved; and voluntary media codes. This report will be updated as circumstances warrant.

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# Terrorism: Background on Chemical, Biological, and Toxin Weapons and Options for Lessening Their Impact

## Introduction

The domestic approach to potential terrorist attacks using chemical, biological, or toxin weapons attempts to balance a “post-event” consequence management approach with a “pre-event,” preventative approach. Legislation and plans have been developed to address the casualties from chemical, biological, or toxin weapons, generally focused on the physical consequences of such weapon use and methods to provide prompt consequence management. Further efforts regarding public outreach, enhancing treatment and prophylaxis through federal initiatives, or additional regulation of materials used in developing chemical, biological, and toxin weapons are areas policymakers may revisit as preventative approaches to reduce the enhanced terror aspect of these weapons

This report provides a general overview of chemical, biological, and toxin weapons and their treatment; a summary of why some of these weapons may be more attractive to terrorist groups than conventional weapons; select aspects of the current response against chemical, biological and toxin terrorism; and potential options towards lessening these weapons’ impact.

## Chemical, Biological, and Toxin Weapons

The widespread public unease following the anthrax mailings and the continued concern regarding possible terrorist use of weapons of mass destruction – nuclear, chemical, biological, or radiological – have highlighted the potential these weapons may have to a terrorist group.<sup>1</sup> This report focuses on chemical, biological, and toxin weapons, whose impact and nature differ from each other and from nuclear or radiological weapons.

Chemical weapons are chemical compounds that have a strong, deleterious effect on the human body, even when encountered in small doses. The different types of chemical weapons include vesicants, which blister and burn on contact;

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<sup>1</sup> For an overview of the potential terrorist use of weapons of mass destruction, see CRS Report RL31332, *Weapons of Mass Destruction: The Terrorist Threat*, by (name redacted). For information on small-scale use of chemical, biological, and toxin weapons, see CRS Report RL32391, *Small-scale Terrorist Attacks Using Chemical and Biological Agents: An Assessment Framework and Preliminary Comparisons* by (name redacted) and (name redacted).

choking agents, which cause lung damage; and nerve agents, which interfere with the nervous system and may lead to death. The effects from chemical weapons may occur very quickly after exposure, on the order of minutes to hours.<sup>2</sup>

Biological weapons are pathogens that cause disease and illness in infected humans. Because the pathogens multiply within the victim, a small initial amount of pathogen is sufficient to cause infection. As a consequence, biological weapons require much less material than chemical weapons to produce equivalent casualties and generally take longer to produce effects. Biological weapons include diseases that are primarily incapacitating, such as Q fever, as well as those that are lethal, such as smallpox. Some biological weapons are contagious pathogens, such as smallpox, and have the potential to spread the effects of an attack by traveling from victim to victim. The symptoms from a biological weapon attack would require some time to develop, so a covert biological attack might not be recognized for several days.<sup>3</sup>

Toxin weapons are primarily illness-inducing chemicals formed from living creatures, such as bacteria, fungi, plants, and animals. Toxins range in effect from disabling to acutely toxic. The most deadly compound currently known, botulinum toxin, is a bacterial toxin. Toxins are more potent than chemical weapons, requiring less material to produce equivalent casualties, but they are not self-reproducing, so more material is required than for a biological weapon. Symptoms from toxin exposure typically occur on a timescale intermediate between chemical and biological weapons, generally appearing over the course of several hours.<sup>4</sup>

## **Terrorist Development of Chemical, Biological, and Toxin Weapons**

The difficulty of obtaining or developing chemical, biological, or toxin weapons has made their use very rare, but these weapons have been used for terror purposes. Sarin, a chemical nerve agent, was used in the Tokyo subway system in 1995 by the Aum Shinrikyo cult.<sup>5</sup> Anthrax bacteria, a biological agent, was used in 2001, infecting individuals in Connecticut, New York, Florida, and the District of Columbia. Also, salmonella bacteria was used by the Rajneeshee cult in 1984 in an attempt to influence local election turnout. Ricin, a toxin, was mailed to the White House in 2003 and Congress in 2004.

Additionally, there have been arrests and news reports of individuals and terrorist organizations that have tried to develop and use chemical and toxin

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<sup>2</sup> For more information on specific chemical agents see chapters 1 - 17 of *Medical Aspects of Chemical and Biological Warfare*, Frederick R. Sidell, Ernest T. Takafuji, David R. Franz, Eds., found online at [<http://www.nbc-med.org/SiteContent/HomePage/WhatsNew/MedAspects/contents.html>].

<sup>3</sup> For more information on specific biological agents see *ibid.*, chapters 18 - 29.

<sup>4</sup> For more information on specific toxin agents see *ibid.*, chapters 30 - 34.

<sup>5</sup> For an overview of the Aum Shinrikyo use of sarin in the Tokyo subway system, see David E. Kaplan, "Aum Shinrikyo (1995)" in Jonathan B. Tucker, Ed., *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, (Cambridge, MA: MIT Press) 2000.

weapons. Videotapes acquired and broadcast by CNN have shown the effects of a chemical agent on test animals.<sup>6</sup> In 2003, British law-enforcement officials arrested several people accused of manufacturing ricin in a London apartment.<sup>7</sup>

Previously, it was thought that the difficulties of developing, weaponizing, and disseminating chemical, biological, and toxin weapons provided high barriers to their use by non-state actors.<sup>8</sup> Advances in molecular biology, chemistry, and engineering have increased the ease by which biological and chemical compounds can be manufactured. Purchasable civilian technologies may be applicable to manufacture of chemical, biological, and toxin weapons.<sup>9</sup> The Defense Threat Reduction Agency was able to assemble the requisite equipment from civilian sources. Under Project BACUS, a biological agent production facility was successfully built in Nevada from dual-use technology without drawing regulatory attention.<sup>10</sup> Some experts maintain that the technological barriers to chemical, biological, and toxin use have significantly decreased.

## **Medical Treatment for Chemical, Biological, and Toxin Weapons' Effects**

Chemical, biological, and toxin weapons also differ in their medical treatment and the availability of effective prophylaxis.<sup>11</sup> Chemical weapons, with their quick-acting effects, must be treated as promptly as possible. Because of the large range of potential effects caused by chemical weapons, there is no universal treatment for chemical weapon exposure.<sup>12</sup> Exposure to nerve agents can be directly treated with medication to prevent or reduce symptoms. Exposure to vesicants, such as mustard gas, is generally untreatable; most people exposed will exhibit the agent's effects.

<sup>6</sup> Nic Robertson, "Disturbing Scenes of Death Show Capability with Chemical Gas," *CNN.com*, August 19, 2002, found online at [<http://www.cnn.com/2002/US/08/19/terror.tape.chemical/index.html>].

<sup>7</sup> For more information on the toxin ricin, see CRS Report RS21383 *Ricin: Technical Background and Potential Role in Terrorism*, by (name redacted) and (name redacted).

<sup>8</sup> U.S. Congress, Office of Technology Assessment, *Technologies Underlying Weapons of Mass Destruction*, OTA-BP-ISC-115 (Washington, DC: U.S. Government Printing Office) 1993.

<sup>9</sup> Such technologies which have both a civilian and a military use are commonly referred to as "dual-use" technologies.

<sup>10</sup> As reported in Judith Miller, Stephan Engelberg, and William Broad, *Germs: Biological Weapons and America's Secret War*, (New York: Simon and Schuster) 2001, p.121.

<sup>11</sup> Prophylaxis is generally spoken of in terms of medical or chemical treatments to protect individuals from chemical, biological, and toxin weapons. In some cases, it also includes mechanical measures such as protective suits or masks.

<sup>12</sup> Atropine and diazepam can be used to treat the effects of nerve agent exposure. See National Center for Environmental Health, Centers for Disease Control and Prevention, *Emergency Room Procedures in Chemical Hazard Emergencies. A Job Aid*, found online at [<http://www.cdc.gov/nceh/demil/articles/initialtreat.htm>].

The effects from vesicant exposure, primarily blisters and lesions, can be treated. In addition, injury from exposure to choking agents, such as chlorine, can be ameliorated by prompt medical treatment to limit permanent lung damage.

Many biological agents either respond to medical treatment or have effective prophylaxis. Single or combination antibiotic regimens, if employed early in the course of the disease, are effective against many bacteria that might be used as biological weapons. Such timely treatment may be difficult if recognition of a bioterror event is delayed. Some viruses targeted as biological weapons have effective prophylaxis in the form of vaccines, while others reportedly respond to antiviral drugs.<sup>13</sup> However, some potential biological weapons lack prophylaxis, treatment, or cure. Additionally, biological weapons can be engineered, with some effort, in a laboratory to be resistant to specific countermeasures.

Treatment of injuries sustained from toxin weapons may be more complicated. Anti-toxins and toxoid vaccines can be developed against toxin weapons, but the process for doing so is involved and time-consuming. Consequently, stores of these medicines are limited in scope,<sup>14</sup> and a large number of toxin weapon casualties could exhaust local supplies. Some toxins, such as botulinum toxin, cause death by paralyzing the muscles used for breathing. These toxins can be treated with supportive care, through artificial ventilation and other means, until the patients recover.

For bioterror events, it is difficult to project the likely treatment success rate. Treatment of chemical, biological, and toxin weapons relies on providing medication within a relatively narrow time window. If medication is not provided fairly quickly after exposure or the development of symptoms, depending on the weapon, full recovery is unlikely.

## **Potential Impacts of Chemical, Biological, and Toxin Weapons**

By their nature, terrorist events are unexpected, shocking, and often perceived as random, and they evoke a sense of fear and uncertainty. Chemical, biological, and toxin weapons use may contribute additional considerations. In part, this is because chemical, biological, and toxin weapons have the potential to cause mass casualties. Effectively disseminated, a single release of a chemical or biological weapon could

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<sup>13</sup> See L. Borio, T. Inglesby, C.J. Peters, A.L. Schmaljohn, J.M. Hughes, P.B. Jahrling, T. Ksiazek, K.M. Johnson, A. Meyerhoff, T. O'Toole, M. S. Ascher, J. Bartlett, J.G. Breman, E.M. Eitzen, Jr., M. Hamburg, J. Hauer, D. A. Henderson, R.T. Johnson, G. Kwik, M. Layton, S. Lillibridge, G.J. Nabel, M.T. Osterholm, T.M. Perl, P. Russell, and K. Tonat, "Hemorrhagic Fever Viruses as Biological Weapons: Medical and Public Health Management," *Journal of the American Medical Association*, 2391-2405 (May 8, 2002).

<sup>14</sup> See Arturo Casadevall, "Passive Antibody Administration (Immediate Immunity) as a Specific Defense Against Biological Weapons," *Emerging Infectious Diseases*, Vol. 8, No. 8 (August, 2002)

cause tens of thousands of casualties.<sup>15</sup> This ability to inflict great numbers of casualties may cause terrorists to view chemical or biological weapons as a viable means for promoting an agenda of terror and destruction. The impact of these weapons may be magnified by other factors.

The use of chemical, biological, or toxin weapons in terror attacks could complicate emergency response due to the need to establish special care facilities for the victims, such as decontamination areas, and the need to protect first responders from the weapon's effects. If first responders became victims through inadequate personal protective equipment or contamination of emergency vehicles, increased casualties and greater social disruption could result.

Furthermore, chemical, biological, and toxin weapons may produce a wide array of effects. Terrorists may believe they can select chemical, biological, or toxin weapons to produce specific results for certain situations. They may believe that these weapons increase their operational flexibility.<sup>16</sup> Since for some chemical, biological, and toxin weapons there exists a delay before symptoms develop, terrorists may feel that their use will increase the chances of successfully avoiding arrest. The variety of potential effects and timing can complicate medical treatment and preparedness, as it might not be readily apparent what chemical or pathogen has caused the symptoms, nor what antidote will prove most effective.<sup>17</sup>

The use of chemical or toxin weapons could generate a disproportionate public response because of a broad public perception that their use is akin to poisoning. According to experts, there has long been fear of and antipathy towards the use of poison. It is especially frightening to the victim, as the symptoms may seem to appear from nowhere. Poisons lacking an antidote may raise concerns further, as the victim perceives that there is no recourse or cure available. The dread generated from the inability to control the situation, and oftentimes one's own bodily safety, is common to victims of chemical weapons, and multiplies anxieties related to these weapons' use.<sup>18</sup>

Biological weapon use may evoke deep-seated concerns regarding epidemic disease and sickness.<sup>19</sup> Plagues have historical and religious associations,<sup>20</sup> and more

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<sup>15</sup> U.S. Congress, Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction: Assessing the Risks*, OTA-ISC-559 (Washington, DC: U.S. Government Printing Office, August 1993).

<sup>16</sup> For an overview of potential terrorist motivations with respect to chemical or biological weapons, see CRS Report RL31831, *Terrorist Motivations for Chemical and Biological Weapons Use: Placing the Threat in Context*, by (name redacted).

<sup>17</sup> This was illustrated by the hostage deaths surrounding Russian soporific gas use. P. Baker and S.B. Glasser, "U.S. Ambassador Critical of Russia In Hostage Crisis: Gas Secrecy May Have Cost Lives, He Says," *The Washington Post*, October 30, 2002.

<sup>18</sup> For an overview of public perceptions of chemical, biological, and toxin weapons, see J. Stern, *The Ultimate Terrorists*, (Cambridge, MA: Harvard University Press) 1999.

<sup>19</sup> H.C. Holloway, A.E. Norwood, C.S. Fullerton, C.C. Engel, and R.J. Ursano, "The Threat (continued...)"



recent epidemics have left their mark on society.<sup>21</sup> Furthermore, victims of diseases that manifest symptoms externally, such as smallpox, may enhance concerns with respect to contagion. Individuals infected by biological weapons may develop marked anxieties in response to the uncertainty of their medical treatment options, health condition, and prognosis.<sup>22</sup> Trauma associated with being a victim of a biological attack may itself inhibit understanding and recovery from the illness.<sup>23</sup> Dread may also arise in those who have not been exposed, but fear that they may have. These anxieties may cause common events to take on new negative meanings. For example, during the anthrax mailings, there were many reports regarding white powders found at people's workplaces which were forwarded to law enforcement authorities; the vast majority were not anthrax related.<sup>24</sup>

Because of heightened individual health anxieties about chemical, biological and toxin weapons, some have suggested that their use could have the potential to result, at the extreme, in panic. When sarin was introduced into the Tokyo subway system in 1995, over 5,500 people arrived at hospitals requesting medical treatment, but only 1,051 people had medical symptoms indicative of sarin exposure.<sup>25</sup> In the case of a widespread dissemination of chemical or biological weapons, the number of people requesting treatment, and the difficulties involved in separating those with actual illness from those with panic-induced symptoms, could greatly complicate effective healthcare and possibly lead to greater public hysteria.

Public panic might have weighty ramifications. If a chemical or biological weapon was disseminated widely, especially in the case of a contagious pathogen, there might be government intervention to quarantine individuals or groups of

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<sup>19</sup> (...continued)

of Biological Weapons: Prophylaxis and Mitigation of Psychological and Social Consequences," *Journal of the American Medical Association*, Vol. 278, 425 (1997).

<sup>20</sup> The Black Plague is estimated to have killed up to 25% of the total population of Europe. The Old Testament of the Bible refers to plagues being brought down upon unbelievers.

<sup>21</sup> The influenza epidemic of 1918 is estimated to have killed over 500 thousand people in the United States and over 20 million people worldwide. J.K. Taubenberger, A.H. Reid, A.E. Krafft, K.E. Bijwaard and T.G. Fanning, "Initial Genetic Characterization of the 1918 'Spanish' Influenza Virus," *Science*, Vol. 275, 1793 (1997).

<sup>22</sup> W.J. Broad and D. Grady, "Threats and Responses: The Victims; Science Slow to Ponder the Ills That Linger in Anthrax Victims," *New York Times*, September 16, 2002.

<sup>23</sup> S. Wessely, K.C. Hyams, and R. Bartholomew, "Psychological Implications of Chemical and Biological Weapons: Long Term Social and Psychological Effects May Be Worse Than Acute Ones," *British Medical Journal*, Vol. 323, 878 (2001).

<sup>24</sup> For example, in Arizona, health authorities reportedly received and tested 1,100 samples of substances that people feared might be contaminated. "Avoiding Panic Over Smallpox; Our Stand: Educational Campaign Will Help Us Ward Off Bioterror Attack," *The Arizona Republic*, September 25, 2002.

<sup>25</sup> T. Ballard, J. Pate, G. Ackerman, D. McCauley, and S. Lawson, "Chronology of Aum Shinrikyo's CBW Activities," Monterey Institute of International Studies, March 15, 2001.

individuals.<sup>26</sup> Panicked flight from areas of perceived danger could complicate response efforts. Additionally, due to the newsworthy aspects of a chemical, biological, and toxin weapon attack, public panic could propagate through media reports to locations not affected by the attack.<sup>27</sup>

While hysterical, widespread panic is cited as a potential public response to mass dissemination of a chemical, biological, or toxin weapon, it is not clear if this is a likely outcome. The loss of public confidence and angry, perhaps violent, competition for medical treatment have been suggested as possible results from a chemical or biological weapon attack.<sup>28</sup> On the other hand, public response after natural disasters has not generally led to public hysteria or unreasoned aggression, even when there has been significant anger directed towards government officials.<sup>29</sup> In previous crises, public anxiety has been successfully reduced by government response.

## **Approaches Preventing Terrorist Use of Chemical, Biological, and Toxin Weapons**

### **Federal, State, and Local Government Actions**

Federal policymakers have addressed reducing terrorist use of chemical, biological, and toxin weapons through programs ameliorating these weapons' destructive aspects and through increased vigilance in detecting and preventing terror attacks in general. Local response to terrorist attack has been further developed through federal programs providing state health departments grant-based funding in order to address vulnerable aspects of their response system.<sup>30</sup> These improvements include further development of hospital and laboratory capacity; development of response networks for timely communication during a bioterror event; development of protocols for communicating between local, state, and federal responders; and

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<sup>26</sup> Issues relating to quarantine and state and federal response to chemical and biological attack were explored in an exercise called TOPOFF. An exercise review can be found in T.V. Inglesby, R. Grossman, and T. O'Toole, "A Plague on Your City: Observations from TOPOFF," *Clinical Infectious Diseases*, Vol. 32, 436 (2001).

<sup>27</sup> For an overview of event communications issues, see "Special Feature: CDC's Pre-Event Message Development Project," in *Biosecurity and Bioterrorism*, Vol. 2, Number 3, 2004.

<sup>28</sup> H.C. Holloway, A.E. Norwood, C.S. Fullerton, C.C. Engel, and R.J. Ursano, "The Threat of Biological Weapons: Prophylaxis and Mitigation of Psychological and Social Consequences," *Journal of the American Medical Association*, Vol. 278, 425 (1997) and C.S. Fullerton and R.J. Ursano, "Behavioral and Psychological Responses to Chemical and Biological Warfare," *Military Medicine*, Vol. 155, 54 (1990).

<sup>29</sup> H. Granot, "Planning For The Unthinkable: Psychosocial Reaction To Chemical and Biological Warfare (CBW) Weapons," *Australian Journal of Emergency Management*, Spring, 21 (2000).

<sup>30</sup> For more information on the development of state and local public health systems' bioterrorism preparedness efforts, see CRS Report RL31719, *An Overview of the U.S. Public Health System in the Context of Bioterrorism*, by (name redacted).

improved education of physicians and health care providers. A concerted federal effort is underway to develop emergency reserves of medicines to combat chemical, biological, and toxin casualties. Additionally, research proposals have been funded in the areas of detection systems and enhanced epidemiological surveillance, to detect chemical, biological, or toxin use as early as possible.<sup>31</sup>

Federal law enforcement agencies now have greater power to gather intelligence on terror groups and their members.<sup>32</sup> Increased information about terrorist groups, combined with apprehension of any who have chemical, biological, or toxin weapons, may provide further barriers to terrorist acquisition and use of these weapons.<sup>33</sup> A registration system for researchers and facilities possessing select agents<sup>34</sup> has been developed by the Department of Health and Human Services, and additional restrictions regarding access to these agents have been made law.<sup>35</sup>

On November 25, 2002, President Bush signed into law the Homeland Security Act of 2002 (P.L. 107-296). This act created the Department of Homeland Security (DHS), which has the primary mission of preventing terrorist attacks in the United States, reducing national terrorism vulnerability, and minimizing damage and aiding in recovery from attacks. DHS coordinates federal preparedness and response to chemical and biological terrorism, the latter in conjunction with the Department of Health and Human Services. DHS has extended grants to local first responders to increase local preparedness against chemical or biological weapons use,<sup>36</sup> and also has established, through the Science and Technology directorate, its own programs for funding research into chemical and biological defense.<sup>37</sup> The DHS has also

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<sup>31</sup> See CRS Report RL31576, *Federal Research and Development Organization, Policy, and Funding for Counterterrorism*, by (name redacted).

<sup>32</sup> See CRS Report RS21203, *The USA PATRIOT Act: A Sketch*, by (name redacted).

<sup>33</sup> See CRS Issue Brief IB10119, *Terrorism and National Security: Issues and Trends*, by Raphael Perl for an overview of policy responses to terrorist threat.

<sup>34</sup> The select agent list, found at 42 CFR 73.0, consists of viruses, bacteria, rickettsiae, fungi, and toxins and is determined by the Secretary of Health and Human Services. Agents on the select agent list are considered to have the potential to pose a severe threat to public health and safety.

<sup>35</sup> See the USA PATRIOT Act (P.L. 107-56) and the Public Health Security and Bioterrorism Preparedness and Response Act (P.L. 107-188). For an overview of the impact of these actions, see CRS Report RL31354, *Possible Impacts of Major Counter Terrorism Security Actions on Research, Development, and Higher Education*, by (name redacted).

<sup>36</sup> For an overview of Department of Homeland Security grant programs and homeland security related issues surrounding first responder preparedness, see CRS Report RL31227, *Terrorism Preparedness: Catalog of Selected Federal Assistance Programs*, by Ben Canada.

<sup>37</sup> For an overview of the Department of Homeland Security Research and Development priorities and funding, see CRS Report RS21270, *Homeland Security and Counterterrorism Research and Development: Funding, Organization, and Oversight*, by (name redacted) and CRS Report RL31914, *Research and Development in the Department of Homeland Security*, by (name redacted).

developed and deployed the Bio-Watch program, which aims to detect releases of biological weapons in urban areas.<sup>38</sup>

## Select Non-governmental Proposals and Actions

Professional societies and non-governmental organizations are also involved in exploring ways to lessen the likelihood of chemical, biological, and toxin weapon use. Selected examples showing the range of activities addressing chemical, biological, and toxin weapons are provided here.

The National Academy of Sciences has completed projects related to chemical, biological, and toxin based terrorism. In addition to convening a Committee on Science and Technology for Countering Terrorism and publishing a document outlining its recommendations,<sup>39</sup> the Institute of Medicine's Board on Neuroscience and Behavioral Health has issued a report on the psychological consequences of terrorism.<sup>40</sup> Projects include an ad hoc committee studying advanced biotechnology standards and practices<sup>41</sup> and the development of a robust, "adaptive" methodology for prioritizing vulnerabilities to terrorism by the National Academy of Engineering.

The American Association for the Advancement of Science have addressed the issues of risk analysis and communication and public health preparedness in a bioterror context. The American Psychological Association has established a Subcommittee on Psychology's Response to Terrorism to aid in coordinating psychology's multifaceted response to terrorism, including coping with the threat of terrorism. These efforts attempt to develop strategies to prepare for or deter the use of terror weapons.

Many think tanks have addressed the concerns that chemical, biological, and toxin weapons present to civilians. The Brookings Institution has held a series of forums on America's response to terrorism.<sup>42</sup> The Cato Institute has held briefings and provided policy suggestions on bioterrorism, with an emphasis on the debate

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<sup>38</sup> For more information on the Bio-Watch program, see CRS Report RL32152, *The Bio-Watch Program: Detection of Bioterrorism*, by (name redacted) and (name redacted).

<sup>39</sup> The National Academy of Science Committee on Science and Technology for Countering Terrorism published its combined recommendations in book form. See National Research Council, *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism*, (Washington, DC: National Academies Press), 2002.

<sup>40</sup> See Institute of Medicine, *Preparing for the Psychological Consequences of Terrorism: A Public Health Strategy*, (Washington, DC: National Academies Press), 2003.

<sup>41</sup> See National Research Council, *Biotechnology Research in an Age of Terrorism*, (Washington, DC: National Academies Press), 2004.

<sup>42</sup> For more information on the Brookings Institution, see [<http://www.brookings.org>].

surrounding smallpox vaccination policy.<sup>43</sup> The Heritage Foundation has held briefings and provided policy suggestions on weapons of mass destruction.<sup>44</sup>

## Potential Policy Options for the 109<sup>th</sup> Congress

Below are some policy options which may reduce the impact of a chemical, biological, or toxin terrorist attack. These include preventing terrorist attacks by increasing the difficulty of chemical, biological, and toxin weapon production; developing countermeasures through directed public health funding; reducing public concern by enhancing public preparedness through outreach efforts; and addressing how the media reports on acts of chemical, biological, and toxin terrorism.

### Increasing Production Barriers

Barriers to chemical, biological, and toxin-related terrorism within the United States may be strengthened by further legislation. One option to increase such barriers would be to address the development and production of chemical, biological, and toxin weapons. This might entail increasing the difficulty of obtaining these weapons by decreasing the ease with which “dual-use” equipment is acquired, either by regulating its domestic sale or through registering owners of such equipment, through a mechanism similar to that for select agents. However, this may have an adverse economic impact on those industries with legitimate need for this equipment, such as the chemical, pharmaceutical, and health industries.<sup>45</sup>

### Directed Public Health Funding

One suggestion would be to continue increased funding to the public health system and law enforcement, in order to provide greater hospital capacity, trained medical and mental health personnel, increased screening and surveillance, and sufficient equipment in the case of a chemical, biological, or toxin terrorist attack. It has been suggested that continued spending on the order of \$10 to \$30 billion per year would provide sufficient depth of response to reduce a chemical, biological, or toxin attack’s effectiveness.<sup>46</sup> On the other hand, some contend that the risk of terrorist attack is so small that money would be better spent on other safety programs, such as highway safety.<sup>47</sup>

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<sup>43</sup> For more information on the Cato Institute, see [<http://www.cato.org>].

<sup>44</sup> For more information on the Heritage Foundation, see [<http://www.heritage.org>].

<sup>45</sup> For a discussion of regulating domestic dual-use biological equipment, see CRS Report RS21422, *Dual-Use Domestic Equipment: Difficulties in Domestic Regulation*, by (name redacted).

<sup>46</sup> Greg Seigle, “Feds Could Make Bioterror ‘Impossible’, Expert Says,” *Global Security Newswire*, April 9, 2002

<sup>47</sup> Roger D. Congleton, “Terrorism, Interest-Group Politics, and Public Policy: Curtailing Criminal Modes of Political Speech,” *The Independent Review*, Summer 2002.

Another option to address the threat of chemical, biological, and toxin weapons is through the development of new antibiotic, antiviral, or antitoxin medicines. While many agents of concern have an acknowledged treatment, many can be improved to have higher efficacy. Alternately, further investment in new vaccines or other methods to induce immunity might provide significant deterrence to terrorist groups planning to use such a weapon. Critics of this approach have suggested that developing treatments for specific agents does not lower the overall threat of chemical, biological, or toxin attacks, but would rather force a terrorist to choose a different agent. Some experts urge that new, broad-based methods to develop resistance against a wide variety of agents must be developed.<sup>48</sup>

In the 2003 State of the Union address, President Bush announced a new program designed to increase the availability of countermeasures against terror agents. This program, called Project BioShield, would provide a government-guaranteed market for manufacturers of countermeasures which lack broader applicability.<sup>49</sup> The Project Bioshield Act of 2004 (P.L. 108-276) was signed into law on July 21, 2004. It provides expedited procedures for bioterrorism-related procurement, hiring, and awarding of research grants, and authorizes the appropriation of up to \$5.593 billion total for FY2004 to FY2013 to purchase countermeasures against terror agents. Project Bioshield appropriations of \$5.593 billion total for FY2004 to FY2013 were provided in the Department of Homeland Security (DHS) Appropriations Act, 2004 (P.L. 108-90).

## Reducing Public Concern

By addressing specific aspects of chemical, biological, and toxin weapons that exacerbate public fears, the federal government may also decrease the usefulness of these weapons to terrorists. The enhanced impact, relative to conventional weapons, of chemical, biological, and toxin weapons might be decreased if the dread felt when considering their effects could be reduced.<sup>50</sup> If this enhanced impact could be successfully reduced, there might be less advantage to using these weapons rather than conventional weapons.

One possible approach for reducing the terror impact of these weapons is public outreach to convey the likely risks and relative dangers chemical, biological, and toxin weapons pose compared to other commonly encountered threats. Further outreach by public health agencies, on either the state or federal level, providing practical information regarding the emergency measures and treatments available in

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<sup>48</sup> This approach has been advocated by the chief scientist for Advanced Biosystems Inc., Dr. Ken Alibek, a bioweapons expert and former first deputy director of Biopreparat.

<sup>49</sup> For more information on Project BioShield, see CRS Report RS21507, *Project BioShield*, by (name redacted).

<sup>50</sup> Some have suggested that the effects of a chemical or biological terrorist attack are overstated and that consequently, the resulting panic may be worse than the threat itself. Steve Connor, "Scientists Condemn Alarmist Official Propaganda Over Bioterrorism," *The Independent*, January 30, 2003.

the case of such an attack might further reduce public concerns that may exist.<sup>51</sup> People facing potential chemical or biological weapon exposure might feel that they had sufficient understanding prior to exposure, and therefore could make rational choices regarding their situation. For example, treatment options and regimens might already be known to victims, and those victims might feel greater control over events, lessening their personal anxiety. As part of the Centers for Disease Control and Prevention's efforts in bioterrorism preparedness, communication such as community outreach and educational efforts are supported.

Some contend that open debate and flow of information regarding chemical and biological terrorism threats lessens the terror aspects of these weapons.<sup>52</sup> Advocates of such information flow suggest that pre-event preparation and education will likely reduce casualties and minimize anxiety or panic following an attack. On the other hand, some have argued that an informational campaign, while decreasing the psychological effect post-exposure, may increase general, day-to-day anxiety.<sup>53</sup> These critics argue that information not presented in the proper context may be counter-productive to attempts to reassure the public. For example, the efforts of the Federal Civil Defense Administration campaign of public relations and educational programs to prepare the population for the possibility of nuclear war in the 1950s may have increased daily anxiety levels while preparing the population. Also, the success of public outreach plans may be difficult to gauge. The Government Accountability Office has recently reviewed several programs containing public outreach components and highlighted the difficulties in assessing outreach effectiveness.<sup>54</sup>

The DHS began a public outreach campaign in February 2003, focusing on civilian preparedness in the case of terrorist attack, including the use of weapons of mass destruction.<sup>55</sup> This campaign includes print and broadcast public-service announcements, a website ([www.ready.gov](http://www.ready.gov)), and a toll-free advice number (1-800-BE READY), as well as mailed information and billboards.<sup>56</sup> The initial outreach efforts of this campaign, called the "Ready Campaign," included advice for preparing homes in case of a chemical or biological attack. This advice, which included suggested purchases of duct tape and plastic, garnered a mixed reception, with some

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<sup>51</sup> Brian Michael Jenkins, "All Citizens Now First Responders," *USA Today*, March 24, 2003.

<sup>52</sup> See, for example, *What Should We Know? Whom Do We Tell?* Chemical and Biological Arms Control Institute, December, 2002, p. 15.

<sup>53</sup> See, for example, William Booth, "Many Americans Worrying About Attack on Homefront," *Washington Post*, March 21, 2003, A28.

<sup>54</sup> General Accounting Office, *Program Evaluation: Strategies for Assessing How Information Dissemination Contributes to Agency Goals*, GAO-02-923, September 2002.

<sup>55</sup> Other outreach campaign are being initiated at the state and city level. See "Health Officials Begin Bioterrorism Awareness Campaign," *Associated Press*, April 22, 2003.

<sup>56</sup> Lynette Clemetson, "Reshaping Message On Terror, Ridge Urges Calm With Caution," *The New York Times*, February 20, 2003.

suggesting that other actions might have a higher priority<sup>57</sup> and others being dismissive of the advice provided.<sup>58</sup> These efforts were criticized for heightening anxiety and providing disaster information without context,<sup>59</sup> and for presenting a mixed message of higher public awareness coupled with suggestions that the public should not take specific actions.<sup>60</sup> Others, while acknowledging that a greater effort to clearly present such advice might be required, maintained the value of such public information dissemination.<sup>61</sup> DHS, in cooperation with the Alfred P. Sloan Foundation and the Ad Council, have developed a series of television and print advertisements, in addition to their other outreach efforts. The success of this outreach program will be evaluated by the Ad Council through surveying public response, but initial use of the website and toll-free number have been high.<sup>62</sup> Other privately funded studies have indicated that the outreach program had not provided a clear conceptual message.<sup>63</sup>

The U.S. Department of Education has recommended to local school systems that a crisis plan be developed in order to prepare for potential terrorist events, including those using chemical or biological agents. The Department of Education has published a guide to aid communities in developing their plan<sup>64</sup> and, in conjunction with DHS, has launched a new section of the Department of Education website dedicated to providing a central location for school emergency planning.<sup>65</sup> Some local school systems have developed “shelter-in-place” plans in case of large-scale biological or chemical attack.<sup>66</sup>

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<sup>57</sup> John Mintz and Lyndsey Layton, “Officials: Safe Room Is Not No. 1 Priority,” *The Washington Post*, February 23, 2003.

<sup>58</sup> Michele McPhee and David Saltonstall, “Mike: Don’t Duct & Cover; Says New Yorkers Shouldn’t Seal Up Homes,” *New York Daily News*, February 14, 2003.

<sup>59</sup> Linda Feldman, “Beyond Duct Tape: Blind Fear Vs. Informed Planning,” *Christian Science Monitor*, February 18, 2003.

<sup>60</sup> David Clarke, “Letter From Nebraska Ave.: Stock Up On Water and Food, But Don’t Worry,” *Congressional Quarterly*, February 10, 2003.

<sup>61</sup> Stephanie Strom, “Beyond Duct Tape and Sheeting, An Unlikely Proponent,” *The New York Times*, February 23, 2003.

<sup>62</sup> Kellie Lunney, “Success of Homeland Security Ad Campaign Won’t Be Easy to Measure,” *GovExec.com*, February 27, 2003.

<sup>63</sup> “Americans Wary Of, But Not Prepared For, More Terror Attacks: Survey,” *Agence France Presse*, April 18, 2003.

<sup>64</sup> U.S. Department of Education, *Practical Information On Crisis Planning; A Guide for Schools and Communities*, May 2003.

<sup>65</sup> The Department of Education website relating to emergency preparedness is found online at [<http://www.ed.gov/emergencyplan/>]. U.S. Department of Education, “Paige, Ridge Unveil New Web Resource to Help Schools Plan for Emergencies,” Press Release, March 7, 2003.

<sup>66</sup> For an example, see David Cho, “Fairfax To Confine Students In Case Of Terrorist Attack,” *The Washington Post*, January 29, 2003.



## Voluntary Media Codes

Another proposal for lessening the impact of chemical, biological, and toxin weapons' terror aspect considers the presentation of information during a chemical, biological, and toxin weapon event. By providing accurate, reliable information during a terror event, public confidence may be bolstered, significantly reducing the terror impact. Some media sources were criticized for presenting the public with incorrect, contradictory, or incomplete information during the anthrax mailings.<sup>67</sup> Some have voiced concern that the media reporting of events provides a confusing mixture of opinion and fact, potentially misleading viewers as to their potential role.<sup>68</sup> The combination of potentially faulty advice and varied expert opinion may have confused the public about what the "right" actions to maximize safety were.<sup>69</sup> The National Academy of Sciences advocates developing a voluntary media code regarding coverage of such attacks, to ensure accurate reporting,<sup>70</sup> and other groups also are exploring the role of media reporting and terrorism.<sup>71</sup> Some editors additionally advocate a more restrained approach to reporting on homeland security and terrorism related news.<sup>72</sup> In the 108<sup>th</sup> Congress, the House Select Committee on Homeland Security held a hearing exploring the different approaches and efforts developed by media organizations to provide a balance between protecting homeland security and providing necessary information to the public.<sup>73</sup>

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<sup>67</sup> For example, advice on personal treatment of mail was alternately disputed or supported by public health professionals and researchers. See J. Dorschner and P. Ogle, "Read This Before Ironing Any Of Your Suspicious Letters," *The Miami Herald Sunday Gazette Mail*, October 21, 2001; D.H. Frazer, "Health Experts Warn Against Anthrax Advice," *Milwaukee Journal Sentinel*, October 20, 2001; and J. Zagars, "Just the Facts?" *The Washington Post*, November 8, 2001.

<sup>68</sup> David Clarke, "GOP Lawmaker Hits Bush On Local Homeland Aid," *CQ Homeland Security*, January 28, 2003.

<sup>69</sup> For an illustrative view of the competing aspects of media coverage of terror related events see The Brookings Institution, "The Role of the Press in the Anti-Terrorism Campaign: The Anthrax Scare and Bioterrorism: Is the Coverage Informative or Needlessly Frightening?", Brookings/Harvard Forum, December 19, 2001, found online at [<http://www.brookings.edu/gs/research/projects/press/121901.htm>].

<sup>70</sup> A precedent for voluntary development of media-controlled norms can be found in the manner by which the media reports on child crime victims. See National Research Council, *Making the Nation Safer: The Role of Science and Technology in Countering Terrorism*, (Washington, DC: National Academies Press) 2002.

<sup>71</sup> For example, the Radio and Television News Directors foundation has developed a media guide for bioterrorism reporting to aid clear, accurate reporting. Radio and Television News Directors Foundation, "Bioterrorism: A Journalist's Guide to Covering Bioterrorism," November 2002, found online at [<http://www.rtndf.org/resources/bioterror.shtml>].

<sup>72</sup> For example, see Lori Robertson, "High Anxiety," *American Journalism Review*, April 2003.

<sup>73</sup> House Select Committee on Homeland Security Hearing on "Combating Terrorism: The Role of Broadcast Media," September 15, 2004.

In an effort to provide accurate and timely expert information, the Centers for Disease Control and Prevention has established a website providing information to those interested in likely biological, chemical, and radiological weapons.<sup>74</sup> In addition to providing information for the general public, they also provide more detailed information for public health, clinical, and laboratory workers. Some have questioned what mechanism will be used to provide the public with authoritative, official information after a biological or chemical attack.<sup>75</sup> Policymakers may wish to further review how to best disseminate information before, during, and after a terrorist attack.<sup>76</sup>

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<sup>74</sup> The Centers for Disease Control and Prevention Public Health Emergency Preparedness and Response website can be found at [<http://www.bt.cdc.gov>].

<sup>75</sup> Kenneth Chang and Judith Miller, "Duct Tape and Plastic Sheeting Provide Solace, If Not Security," *The New York Times*, February 13, 2003.

<sup>76</sup> Similar consideration of the role of the media regarding terrorist events has been undertaken by the Council of Europe. For more information, see the Media Division of the Council of Europe's Directorate General of Human Rights found online at [<http://www.coe.int/media/>].

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