SPOTLIGHT

PROMOTE THE ANTIDOTE

REDUCING THE RISK FROM TOXINS

A PLAN BY THE BIPARTISAN COMMISSION ON BIODEFENSE AT THE ATLANTIC COUNCIL

May 2026

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Atlantic Council
SCOWCROFT CENTER
FOR STRATEGY AND SECURITY

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BACKGROUND

- Russia used epibatidine (a lethal neurotoxin derived from a South American poison dart frog) to assassinate opposition leader Alexei Navalny.
- Toxins are biologically derived poisons produced by algae, vertebrate and invertebrate animals, bacteria, cyanobacteria, fungi, insects, and plants.
- Toxins are not infectious and do not replicate.
- Toxins are inhaled, injected, ingested, or absorbed.
- Most toxins are odorless and do not affect skin.
- The use of toxins in weapons dates back to 1500 BCE.
- Some toxins interfere with nerve impulses and cellular membranes, and they can be used as nerve agents in weapons.
- Even extremely low doses (e.g., a few micrograms) of some toxins are deadly.
- Botulinum toxin disrupts nerve impulses and muscle contraction.
- *Clostridium botulinum* toxin, *clostridium perfringens* epsilon toxin, and *Ricinus communis* toxin remain on the Centers for Disease Control and Prevention (CDC) list of biological agents of great concern.[1]
- Japanese Unit 731 conducted research on the use of botulinum toxins in weapons in the 1930s in Manchuria.
- An umbrella tip laced with ricin killed Bulgarian dissident Georgi Markov in 1978.
- Letters containing ricin were sent to President Barack Obama in 2013 and President Donald Trump in 2018 and 2020.
- Nation-states, terrorists, and lone actors have weaponized toxins.
- Toxins contaminate food and feed before, during, and after harvest.
- Amanita phalloides is the most poisonous of all known mushrooms—as little as half of one of these mushrooms contains enough toxin to kill an adult.
- China, Germany, Japan, Russia, the United Kingdom (UK), and the United States (US) included toxins in their offensive biological weapons programs during World War II.
- Historical and recent toxin-related assassinations illustrate the enduring appeal of toxins due to their lethality and the difficulty of tracing their origins.[2]
- Terrorist organizations and lone actors find some toxins (e.g., ricin) easy to produce.
- Al-Qaeda and the Islamic State of Iraq and al-Sham (ISIS) have attempted to obtain and use ricin for terrorist attacks and encourage this use.[3]
- Synthetic biology allows for the creation of novel, and the enhancement of existing, toxins, increasing their effectiveness and reducing the risk of detection.
- The Gujarat Anti-Terrorist Squad in India arrested three men with terrorist links to ISIS-Khorasan Province, Jaish-e-Mohammed, and Ansar Ghazwat-ul-Hind with arms, explosives, and 4 kilograms of ricin-making materials flown by drone across the Pakistan border. The three men planned to attack areas in at least three Indian cities.[4]
- The Department of State (DOS) suspects that China is producing marine toxins for military purposes.[5]

INTRODUCTION

TOXINS POSE A PERSISTENT AND EVOLVING THREAT TO NATIONAL SECURITY.

While toxins occur naturally, contaminating food and feed with sometimes deadly consequences, malevolent actors have weaponized toxins for assassination and mass-casualty terror. Nation-states, terrorists, and lone actors continue to produce and weaponize these agents. The February 2026 confirmation by European governments that Russian opposition leader Alexei Navalny was assassinated using epibatidine (a lethal neurotoxin derived from a South American poison dart frog) underscores the twenty-first century reality of state-sponsored toxin warfare.[6] Yet, national and international defenses remain fractionated. Efforts to address toxin threats span the agriculture, defense, law enforcement, and public health sectors, which often operate in silos.

A number of characteristics make toxins attractive as weapons. Many are nonvolatile and do not affect or penetrate the skin, making them easier to handle than many chemical weapons. Toxins do not persist indefinitely in the environment and do not transmit from person to person, making them easier to control than contagious biological agents.[7] Without the need for advanced scientific methods or infrastructure, toxins can be derived from plants, bacteria, cyanobacteria, algae, fungi, and animals, including snakes and scorpions that produce venom.[8]

Because toxins occur naturally and can be found in many sources of food, it might be difficult to determine whether an attack involving a toxin occurred. The rapid advancement of biotechnology (e.g., synthetic biology, nanotechnology) has also made it easier for both state and non-state actors to produce, and more easily weaponize, toxins.[9] The convergence of synthetic biology and artificial intelligence (AI) allows for the creation of novel, and the enhancement of existing, toxins.[10]

Actions to address the threat of toxins span communities, regulations, laws, and treaties. Regulatory standards vary among countries and at least one hundred nations have introduced legislation concerning mycotoxins (e.g., Argentina, Australia, Brazil, Canada, China, all European Union member states, Japan, Morocco, New Zealand, and the United States).[11] Most of this legislation pertains to aflatoxins, ergot alkaloids, deoxynivalenol, and ochratoxins. The Codex Alimentarius Commission is establishing international guideline levels for specific toxins such as aflatoxins.[12] Although countries do not generally harmonize these legislative actions, the European Union and several other geographic regions have done so.[13]

The Biological and Toxin Weapons Convention (BTWC) aims to prevent the malevolent use of biological agents.[14] However, the BTWC lacks effective verification and enforcement mechanisms that would at least deter the development and use of weapons containing diseases and toxins. Rapid advancements in biotechnology and AI further complicate efforts to regulate toxins, as these technologies can be used to engineer novel toxins that defy verification.[15]

Detection, diagnostic, therapeutic, and vaccine capabilities for toxins advanced significantly over the past few decades, driven by the need to counter the use of toxins in biological attacks. However, challenges remain, including the need for universal detection, improved diagnostics, and effective countermeasures. To ensure resilience, the United States must aggressively promote the antidote through the rapid development of broad-spectrum countermeasures.

The policymaking community is not fully aware of the expansion of the threat from toxins, instead focusing on contagious biological threats arising from viruses and bacteria. Significant and systemic governmental policy gaps persist despite a clear history of accidental contamination, criminal use, and the continued development of toxins in foreign offensive biological weapons programs. The United States cannot afford to ignore these vulnerabilities. It must identify and bridge these policy gaps immediately, as any biological event involving toxins will have profound implications for national and global security.

RECOMMENDATIONS

INCREASE INTELLIGENCE EMPHASIS

The Intelligence Community (IC) must shift from viewing toxins as legacy threats to recognizing them as active components of modern offensive biological weapons programs. We know that toxins were part of offensive biological weapons programs in the past, so we should assume they remain part of identified and suspected biological weapons programs in the present. Current assessments indicate a disturbing evolution in state-level activities. The Department of State reports that China has conducted research into dual-use marine toxins, raising concerns about compliance with the BTWC and Chemical Weapons Convention (CWC).[16] Additionally, the department states that Russia, Iran, and North Korea continue to pursue toxins for (or for what could be) military purposes.[17] The Office of the Director of National Intelligence shares these concerns.[18]

The rapid advancement of generative technologies widens this intelligence gap. Artificial intelligence and large language models (LLMs) lower the barrier to entry for designing novel, and optimizing existing, toxic proteins for greater lethality and stability.[19] The convergence of AI and synthetic biology means that an adversary could design a toxin that evades current detection capabilities.[20] The IC must expand its collection and analysis capabilities to specifically focus on the use of AI to design toxins.

In accordance with Recommendation 5 of the 2024 National Blueprint for Biodefense, the commission recommends the following.

Recommendation 1: Increase emphasis on toxins in biological intelligence collection and analysis.

Congress should amend the Intelligence Authorization Act to direct the director of the Central Intelligence Agency to produce a dedicated National Intelligence Estimate on the current and emerging threat from toxins, distinct from other biological or chemical weapons estimates; together with the Defense Intelligence Agency, develop a comprehensive database of foreign military-medical research on potent toxins, including marine toxins; increase collection on the procurement of dual-use biotechnologies by state and non-state actors for toxin production; develop new indicators and warnings for toxin-based assassination plots and limited-use scenarios; increase monitoring of the digital proliferation of toxin design data via platforms; and report the findings and conclusions of the IC assessment of China, Russia, Iran, and North Korea to the House Committee on Armed Services, House Committee on Foreign Affairs, House Committee on Homeland Security, House Permanent Select Committee on Intelligence, House Committee on the Judiciary, Senate Committee on Armed Services, Senate Committee on Foreign Relations, Senate Committee on Homeland Security and Government Affairs, Senate Committee on Intelligence, and Senate Committee on the Judiciary.

DETERMINE FINAL DISPOSITION

The collapse of nation-state biological weapons programs often results in a chaotic period during which material, documentation, and expertise proliferate. For example, following the 1991 Gulf War, Iraq admitted to producing 19,000 liters of botulinum toxin and 8,500 liters of *Bacillus anthracis* (the bacteria that causes anthrax).[21] While Iraq claimed to have destroyed these stockpiles, United Nations Special Commission inspectors identified significant discrepancies, particularly regarding unaccounted-for bacterial growth media sufficient to produce three to four times the declared amount of anthrax.[22] The final disposition of these biological agents and related capabilities remains uncertain.[23]

Similarly, the legacy of the massive former Soviet Union (FSU) biological weapons program continues to pose risks. The FSU used facilities such as the open-air test site on Vozrozhdeniya Island to test genetically modified pathogens and toxins, including antibiotic-resistant plague and botulinum toxin.[24] While the United States engaged in Cooperative Threat Reduction program efforts to decontaminate and repurpose parts of this site and others, concerns persist regarding the destruction of the FSU biological weapons program and diversion of materials and expertise to other actors during the dissolution of the FSU.[25] They remain potential sources for non-state actors and rogue states seeking weaponized biological agents. Toxins remain readily available for use by state actors, as exemplified by Russia's assassination of Navalny with a neurotoxin derived from poison dart frogs.[26]

In accordance with Recommendation 5 of the 2024 National Blueprint for Biodefense, the commission recommends the following.

Recommendation 2: Determine the disposition of previously weaponized toxins.

Congress should amend the National Defense Authorization Act to direct the secretary of defense, in coordination with the secretary of state and the director of the Central Intelligence Agency, and in consultation with the director of the Defense Threat Reduction Agency to determine the current disposition, security, and status of legacy biological toxin stockpiles from the FSU, Iraq, and other identified and suspected toxin programs; direct a focused collection effort to identify likely storage locations, research, development, and manufacturing activities, modernization of legacy toxin production facilities, and any military-civilian collaborations (e.g., private sector, universities) to store, design, or produce toxins; update and distribute, to the maximum extent possible, all historical intelligence estimates about the FSU, Iraq, and other programs' toxin production and weaponization; and provide an unclassified report with a classified annex (or an entirely classified report) to the House Committee on Armed Services, House Committee on Foreign Affairs, House Committee on the Judiciary, House Permanent Select Committee on Intelligence, Senate Committee on Armed Services, Senate Committee on Foreign Relations, Committee on Intelligence, and Senate Committee on the Judiciary on these findings, including an assessment of the historical, current, and potential transfer of these legacy toxins to non-state actors.

INCREASE CONTAMINATION SURVEILLANCE

Both accidental contamination and intentional adulteration with toxins place the global food and feed supply chain (composed of multiple interconnected chains) at massive risk. Naturally occurring mycotoxins (e.g., aflatoxins produced by fungi in corn and peanuts) already cause significant economic losses and health risks, with aflatoxin contamination being a leading cause of border rejections of food imports.[27] Intentional attacks with heat-stable toxins introduced into processed foods increase vulnerability to this same supply chain.[28] The volume of global trade makes traditional sample and test methods insufficient for detecting intentional contamination events.[29]

The primary US regulation addressing this topic is the Food and Drug Administration (FDA) Food Safety Modernization Act (FSMA) Final Rule on Intentional Adulteration.[30] This rule's stated goal is to prevent acts intended to cause widespread consequences for public health. It requires food processing facilities to conduct vulnerability assessments and implement written food defense plans. The FDA designed it to address an insider threat or an attack on a specific point in a production line. While the rule applies to any food produced overseas that will come into the United States for consumption, it severely lacks enforcement. The FDA currently employs only five US-based inspectors capable of conducting these food defense inspections, with virtually no inspection of foreign food production facilities. Addressing this transboundary contamination and ensuring adequate staffing remain critical needs for securing the food and agriculture sector.[31]

In accordance with Recommendations 11, 16, 27, and 31 of the 2024 National Blueprint for Biodefense, the commission recommends the following.

Recommendation 3: Increase monitoring and information sharing to prevent the introduction of toxins into global food and feed supply chains.

The secretary of homeland security, in coordination with the secretary of agriculture and the secretary of health and human services, should require the Food and Agriculture Critical Infrastructure Sector Information Sharing and Analysis Center to rapidly disseminate specific, actionable intelligence or information on toxin-related threats to trusted partners and deploy these rapid screening technologies at US ports of entry, prioritizing high-risk import pathways such as seafood. The secretary of health and human services should: direct the FDA to finalize guidance for and accelerate implementation of the FSMA Intentional Adulteration rule, while developing supplementary measures to reduce vulnerabilities from upstream foreign-sourced ingredient contamination; restore the FDA Division of Preparedness and Emergency Programs to, at minimum, its 2024 staffing levels, including food systems expertise; increase the number of FDA food defense inspectors and extend inspections to foreign facilities supplying high-risk ingredients to the US market; and, in coordination with the secretary of agriculture and the secretary of homeland security, develop a dedicated response plan for a large-scale intentional food contamination event involving a toxin.

IMPROVE CLINICAL DIAGNOSTICS

Early symptoms of toxic poisoning can often mimic common illnesses, challenging the diagnosis of attacks involving toxins. For example, exposure to Staphylococcal enterotoxin B (SEB) presents with flu-like symptoms, and botulism can be confused with stroke and Guillain-Barré syndrome.[32] This ambiguity, combined with a lack of physician awareness and rapid diagnostic tools, increases the odds of misdiagnosis, delaying recognition of the exact toxin and the fielding of an effective response.

Overlap within the Laboratory Response Network (LRN) compounds this diagnostic uncertainty. A single high-consequence toxin could be considered a biological agent or a chemical agent, depending on the testing method used. For example, LRN for Biological Threats (LRN-B) laboratories identify biological agents (e.g., ricin), while LRN for Chemical Threats (LRN-C) laboratories confirm exposure to these same toxins by measuring chemical biomarkers (e.g., ricinine).[33] Hospitals also currently lack guidelines to navigate this bifurcation, leaving clinicians unsure about with whom to engage and introducing critical delays in verifying a toxin attack.

In accordance with Recommendation 29 of the 2024 National Blueprint for Biodefense, the commission recommends the following.

Recommendation 4: Develop and provide diagnostic guidelines, equipment, and tests for toxins in clinical settings.

The secretary of health and human services should: direct the Centers for Disease Control and Prevention (CDC) to develop and issue standardized clinical guidelines for the diagnosis and treatment of high-threat toxins (e.g., abrin, ricin, SEB, T-2 mycotoxin) to all US emergency departments, urgent care facilities, trauma centers, and hospitals; direct the Biomedical Advanced Research and Development Authority (BARDA) and National Institutes of Health (NIH) to accelerate the development, approval, and procurement of rapid, point-of-care diagnostic tests for toxins for use in hospital emergency departments; and direct the assistant secretary for preparedness and response to fund the National Emerging Special Pathogens Training and Education Center to develop a national training program for clinicians on recognizing the syndromic presentation of a toxin biological attack and then disseminate it through the Administration for Strategic Preparedness and Response Technical Resources, Assistance Center, and Information Exchange, as well as the CDC's Public Health Emergency Preparedness Program.[34]

DEVELOP A THERAPEUTICS PIPELINE

The Strategic National Stockpile (SNS) historically prioritized medical countermeasures (MCMs) for threats like anthrax and smallpox, leaving a significant deficit in preparedness for toxin threats.[35] While the SNS contains antitoxins for botulism, it lacks FDA-approved therapeutics for other high-threat toxins such as ricin and SEB. Currently, toxin treatments rely almost entirely on post-exposure therapeutics.

The United States needs broad-spectrum therapeutics and platform technologies for toxins. Current research into polyclonal antibodies and small molecule inhibitors shows promise for neutralizing multiple variants or serotypes of a toxin, which is essential given the diversity of toxin threats and their modes of action. Agencies including BARDA and the Department of Defense Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense (JPEO-CBRND) support this development, but bridging the funding and logistical gap between early-stage basic research and late-stage advanced development and procurement requires sustained funding and prioritization for each agency along this pipeline.[36]

In accordance with Recommendations 17 and 18 of the 2024 National Blueprint for Biodefense, the commission recommends the following.

Recommendation 5: Develop a robust and sustainable pipeline of medical countermeasures, prioritizing broad-spectrum therapeutics for high-threat toxins.

The secretary of health and human services, in coordination with the secretary of defense, should: direct the Public Health Emergency Medical Countermeasures Enterprise to identify critical gaps in the SNS for non-commercially available MCMs against non-anthrax, non-botulism high-threat toxins (e.g., ricin, abrin, SEB, T-2 mycotoxin); direct BARDA to expand its Botulinum Neurotoxin Candidate Therapeutic Testing Services program to address other high-threat toxins to accelerate research and development; and direct BARDA and the JPEO-CBRND to prioritize funding for, and procurement of, broad-spectrum therapeutic platforms (e.g., polyclonal antibodies, small molecule inhibitors) over single-agent vaccines for the SNS.

IMPROVE SOURCE IDENTIFICATION

Attribution poses a difficult challenge to biodefense with regard to toxins because many occur naturally. An attack using SEB or a simple case of mishandled potato salad at a picnic could produce a cluster of food poisoning. Without the ability to scientifically distinguish between the two, it is possible to either miss an attack or attribute a tragedy falsely to a malicious actor instead of a naturally occurring source. Forensic science can help offer a solution through chemical attribution signatures.[37]

The method used to produce a toxin often leaves behind a unique signature (e.g., specific impurities, fatty acids, DNA fragments). Analyzing the fatty acid profile of a ricin sample, for example, can reveal the use of a crude kitchen recipe (indicating a lone actor) or a sophisticated purification process (indicating a state program). Traditional forensic analysis of toxins relies on antibody-based assays or mass spectrometry to confirm the presence of a toxin.[38] However, new techniques are emerging, such as forensic proteomics (a method that analyzes all proteins in a sample of unknown characterization).[39] The United States must build a robust library of protein attribution signatures and equip law enforcement with the tools to detect them.

In accordance with Recommendation 6 of the 2024 National Blueprint for Biodefense, the commission recommends the following.

Recommendation 6: Improve the ability to differentiate between natural occurrence and intentional use of toxins.

Congress should amend the Biological Weapons Anti-Terrorism Act of 1989 (P.L. 101-289) (BWATA) to direct the attorney general, in coordination with the secretary of energy and secretary of health and human services, to: establish a comprehensive database of chemical attribution signatures for high-priority toxins, including impurity profiles and production byproducts; develop standardized protocols for the collection and forensic analysis of toxin-related evidence by state, local, tribal, and territorial law enforcement; and develop advanced characterization methods and other forensic technologies that can determine the time, method, of toxin production, alteration, and development using synthetic biology.

ESTABLISH STRICTER PENALTIES

The current US legal framework, anchored in the Biological Weapons Anti-Terrorism Act of 1989 (18 U.S.C. § 175), contains significant loopholes regarding intent.[40] Prosecution depends on proving that a suspect possessed a biological agent specifically for use as a weapon. While the statute exempts possession for bona fide research, it fails to provide a legal definition of that term. This allows bad actors to claim they possessed lethal toxins for peaceful research, making prosecution difficult.[41] Furthermore, the US Code clause referring to restricted possession (which prohibits unjustified possession) carries a maximum sentence of only ten years, which is arguably insufficient given the severity of the crime. Finally, the law does not adequately address gross negligence.

Congress must amend the law to criminalize reckless disregard for public safety in the handling of select agents. Just as the risk of drunk driving makes it a crime, reckless handling of agents such as ricin should result in criminal punishment, regardless of whether the actor intended to use them in a weapon. Doing so would close the legal gap that currently allows dangerous negligence to go unpunished, and would provide prosecutors with the tools necessary to charge individuals who endanger the public, even without definitive proof of intent to weaponize.

In accordance with Recommendation 25 of the 2015 National Blueprint for Biodefense: Leadership and Major Reform Needed to Optimize Efforts, the commission recommends the following.

Recommendation 7: Establish stricter penalties for production, intent to use, and attempted use of toxins to harm others.

Congress should amend the Biological Weapons Anti-Terrorism Act of 1989 (P.L. 101-289) to: establish a criminal offense for the handling, transport, or storage of biological select agents and toxins with reckless disregard for public health and safety, independent of specific weaponization intent; establish a statutory definition of bona fide research to require the types and quantity of select agents and toxins possessed to be objectively reasonable for a lawful purpose and establish that curiosity and self-education regarding select agents and toxins do not constitute a bona fide peaceful purpose; explicitly include attempts and conspiracies to possess unjustified quantities of select agents and toxins, ensuring that law enforcement can prosecute individuals seeking to acquire toxins (e.g., via online marketplaces) prior to physical possession; and direct the US Sentencing Commission to remove the statutory maximum for unjustified possession (currently ten years) and consider adding mandatory minimum sentencing to ensure that possession of select agents and toxins serves as a significant deterrent, regardless of the defendant's specific motive. The attorney general should subsequently utilize these stricter penalties.

IMPROVE CONVENTIONS' GOVERNANCE

The BTWC and the CWC maintain overlapping jurisdiction over toxins. Both treaties already prohibit toxins: the BTWC covers all biological agents and toxins regardless of any enumerated list, and the CWC's general purpose criterion prohibits the use of any toxic chemical for purposes inconsistent with the CWC. However, the BTWC lacks a verification regime entirely and, within the CWC, only ricin and saxitoxin are currently listed on the verification schedules.[42] Toxins not appearing on those schedules, while fully prohibited, are not subject to the CWC's mandatory declaration and inspection requirements. This gap allows state actors to pursue offensive toxin research and development programs that violate the prohibitions of both treaties, while exploiting the absence of verification machinery to avoid detection.

The scientific advisory board of the Organisation for the Prohibition of Chemical Weapons (OPCW) previously identified the nine most relevant toxins that pose security risks, yet seven of these are not on the CWC verification schedules.[43] Adding specific toxins to these schedules, while valuable for near-term deterrence, is insufficient. Any fixed list will be inherently incomplete. For example, the toxin used to assassinate Navalny did not appear on the OPCW's comprehensive assessment, and advances in AI will further accelerate the production of novel toxins that evade existing schedules. The international community must bring known high-threat toxins under the CWC's verification umbrella while simultaneously building broad-spectrum detection and attribution capabilities that do not rely on fixed schedules.

In accordance with Recommendation 7 of the 2024 National Blueprint for Biodefense, the commission recommends the following.

Recommendation 8: Strengthen verification of toxins under the CWC.

The secretary of state should: formally recommend and promote the CWC as the primary international mechanism by which toxin events are investigated; formally nominate the seven most relevant toxins identified by the 2023 OPCW scientific advisory board report (i.e., abrin, aflatoxins, botulinum toxins, epsilon toxin, Staphylococcus aureus enterotoxins, T-2 toxin, and tetrodotoxin), along with epibatidine, for addition to Schedule 1 of the CWC Annex on Chemicals; conduct a diplomatic campaign to build support for this nomination as a measure to strengthen near-term CWC enforcement, while recognizing that schedule expansion alone cannot address novel or AI-derived toxins and that some states parties might resist expansion; direct the US ambassador to the OPCW to request that its technical secretariat develop broad-spectrum analytical and verification methods capable of detecting and attributing toxins regardless of whether they appear on the CWC schedules, with dedicated funding to ensure this capability does not divert resources from existing chemical weapons defense and verification programs; and work with the UN secretary-general to strengthen the UN secretary-general's Mechanism for Investigation of Alleged Use as a complementary verification pathway for toxin incidents, leveraging its existing laboratory roster and analytical capabilities.

Table 1. Recommendations for action

RECOMMENDATIONS	CONGRESS SHOULD...	FOR ADMINISTRATION ACTION BY...
1. Increase intelligence emphasis	Amend the Intelligence Authorization Act and conduct oversight.	Director of national intelligence and director of the Defense Intelligence Agency
2. Determine final disposition	Amend the National Defense Authorization Act, conduct oversight, and provide appropriations.	Secretary of defense, in coordination with the secretary of state and the director of the Central Intelligence Agency, and in consultation with the director of the Defense Threat Reduction Agency
3. Increase contamination surveillance	Conduct oversight and provide appropriations.	Secretary of agriculture, secretary of health and human services, and secretary of homeland security
4. Improve clinical diagnostics	Conduct oversight and provide appropriations.	Secretary of health and human services
5. Develop a therapeutics pipeline	Conduct oversight and provide appropriations.	Secretary of health and human services and secretary of defense
6. Improve source identification	Amend the Biological Weapons Anti-Terrorism Act of 1989, conduct oversight, and provide appropriations.	Attorney general, in coordination with the secretary of energy and secretary of health and human services
7. Establish stricter penalties	Amend the Biological Weapons Anti-Terrorism Act of 1989 and conduct oversight.	Attorney general
8. Improve conventions' governance.	Conduct oversight and provide appropriations.	Secretary of state

CONCLUSION

The threat posed by toxins is distinct, growing, and outpacing US defensive capabilities. Toxins have become a preferred tool for assassination, terrorism, and nation-state strategic advantage. Compliance and intelligence reports addressing the offensive biological weapons programs (that include toxins) in North Korea and Russia, and activities involving toxins in China and Iran, underscore the urgency of this issue.[44] The United States can no longer afford to treat toxins as if they are simply extensions of viruses or bacteria. Eliminating this threat requires a resolute, tailored approach.

Implementing the eight recommendations in this report will eliminate the most glaring vulnerabilities in US national defense against toxins. Taking the threat seriously and strengthening the response can reduce the impact of the toxins that continue to threaten the nation and the world. Promoting the antidote—in terms of both increased priority and awareness—can prevent contamination of the food supply, force a change in methods for assassination, and strengthen deterrence and counter-proliferation of weapons containing toxins.

ACRONYMS

AI	Artificial intelligence
BARDA	Biomedical Advanced Research and Development Authority
BTWC	Biological and Toxin Weapons Convention
CDC	Centers for Disease Control and Prevention
CWC	Chemical Weapons Convention
DOS	Department of State
FDA	Food and Drug Administration
FSMA	Food Safety Modernization Act
FSU	Former Soviet Union
IC	Intelligence Community
ISIS	Islamic State of Iraq and al-Sham
JPEO-CBRND	Joint Program Executive Office for Chemical, Biological, Radiological, and Nuclear Defense
LLM	Large language models
LRN	Laboratory Response Network
MCM	Medical countermeasures
OPCW	Organisation for the Prohibition of Chemical Weapons
PL	Public law
SEB	Staphylococcal enterotoxin B
SNS	Strategic National Stockpile
US	United States
USC	US Code

METHODOLOGY

Established in 2014, the Bipartisan Commission on Biodefense informs US biodefense and provides recommendations for change. It is now part of the Scowcroft Center for Strategy and Security at the Atlantic Council. The commission—supported by academia, foundations, and industry—continues to determine where the United States falls short in addressing bioterrorism, biological warfare, accidental releases of pathogens from facilities, and emerging and reemerging naturally occurring infectious diseases that affect national security.

RESEARCH QUESTIONS

To examine US capability and capacity to defend against toxins, we developed the following research questions:

- What are the historical and current toxins threat landscapes?
- Why use toxins instead of weapons containing contagious agents?
- Which toxins have been used in attacks and crimes?
- How do toxins affect human health and the environment?
- What diagnostic tools and therapeutic treatments are available for toxin exposure?
- How can the nation effectively remediate areas affected by toxins?
- Is the US military ready to fight against weapons containing toxins?
- How well do the BTWC and CWC address toxins?

PRELIMINARY RESEARCH

The commission reviewed previous research efforts, scientific studies, and previous federal strategies, plans, funding, and research and development programs related to the defense against toxins. This review allowed for an assessment of the comprehensiveness and effectiveness of biodefense in this regard.

ANALYSIS

Staff synthesized and evaluated ideas, feedback, and suggestions given, alongside individual expert interviews and literature review, to help inform the development of this report. Staff evaluated findings and recommendations considering the commissioners' own experiences. Staff did not use quantitative methods for this analysis.

LIMITATIONS

Several biodefense programs and policies; intelligence, raw data, and documents; appropriations and budget documents; and other sensitive information are classified or otherwise unavailable. The commission did not review these materials.

ENDNOTES

[1] "Select Agents and Toxins List," Centers for Disease Control and Prevention, last updated 2025, https://www.selectagents.gov/sat/list.htm.

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