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## PUBLIC HEALTH LABORATORIES:

# Unprepared and Overwhelmed

### EXECUTIVE SUMMARY

Once considered only a remote possibility, today the risk of biological, chemical and radiological terrorist attacks on American soil is stunningly real.

Defending the public from these attacks requires more than effective law enforcement and a strong military; it also demands a fully functional, carefully coordinated public health system.

This report examines the capabilities of a crucial, but often overlooked component of that system: America's public health laboratories. It specifically assesses the ability of these laboratories to respond to a terrorist chemical attack.

The nation's 2,000 state and local public health laboratories, together with hospitals and local health departments, would quite literally be 'front-line' defenders in case of a terrorist attack. By properly identifying the biological, chemical, or radiological agent used in an assault, these laboratories will drive a series of critical treatment, containment, and clean-up decisions.

**The results of this study are stark: America's public health laboratories are dangerously**

**unprepared for an attack using chemicals as weapons.** Despite the fact that intelligence officials have warned that such an event is likely, these laboratories are profoundly ill-equipped to provide the fast answers essential to saving lives and limiting chaos. While some measures have been taken to address the public health system in the wake of September 11, 2001, they have focused almost exclusively on bioterrorism, leaving a particularly glaring gap in preparedness for chemical events.<sup>1</sup>

In fact, the report demonstrates that 30 years of inadequate funding and the absence of federal oversight have rendered public health laboratories unable to respond appropriately to more traditional hazards, let alone acts of terrorism. **Public health specialists point out that, while the technologies and expertise exist to manage these types of threats, laboratories lack the resources to access them.**

# Overview of the Study

**T**FAH conducted a two-part study to assess the critical role of public health laboratories in the event of a terrorist chemical attack, and the risks facing the public if these facilities are not prepared. The two research efforts included:

1. A survey of five state public health laboratory directors, who are on the Board of the Association of Public Health Laboratories, and who were asked to determine based on a hypothetical chemical weapons attack at a sports event; (a) how each lab would respond, and (b) the nature of shortcomings in its preparedness.
2. An evaluation of the preparedness of state public health laboratories (SPHLs) to respond to attacks involving the use of three industrial chemicals that are generally recognized as potential agents of chemical terrorism.

## Part I: Survey of State Public Health Laboratory Directors

TFAH's survey of state laboratory directors based on the hypothetical terrorist event revealed that their response would likely be "haphazard and lengthy." For example, in most cases, identifying the substances used by terrorists would require shipping samples of the unidentified chemicals to the federal Centers for Disease Control and Prevention

(CDC) in Atlanta, Georgia. Laboratory directors anticipate that, even on an expedited basis, they would be forced to wait a minimum of 24 hours before an analysis was available. One director said the wait could be "two to three days...if we are lucky." The time lost could impair the ability to treat victims and could cost lives.

### SYNOPSIS OF HYPOTHETICAL EVENT:

*At a basketball game at a major indoor arena, a crew of terrorists sitting behind the home team's bench sprays a noxious chemical. Players and fans in the immediate vicinity begin choking, having seizures and fainting. Thousands of fans throughout the building begin to suffer. Emergency personnel rush to the scene, but are themselves exposed to toxic fumes. The survival of all those exposed depends upon prompt, proper identification of the hazardous substance. Patients must receive antidotes quickly, but if the wrong antidote is administered, lives could be lost.*

*– Scenario based on March 7, 2003, false-alarm terrorism scare at FleetCenter in Boston, MA*

THE DEFICIENCIES IN THE NATION'S PUBLIC HEALTH SYSTEM ARE NOT THEORETICAL PROBLEMS. IN THE EVENT OF A TERRORIST ATTACK, THEY ARE LIKELY TO COST AMERICAN LIVES. AS SCOTT BECKER, EXECUTIVE DIRECTOR OF THE ASSOCIATION OF PUBLIC HEALTH LABORATORIES (APHL) DESCRIBED IT, "IF WE HAVE TO RESPOND TO A CHEMICAL TERRORISM EVENT, IT WILL BE A TRAIN WRECK. ONLY EIGHT STATE PUBLIC HEALTH LABORATORIES HAVE A CHEMICAL TERRORISM RESPONSE PLAN IN PLACE. WE DON'T HAVE A NATIONAL PLAN, OR TESTING METHODS, OR A LEAD AGENCY FOR MANY OF THE LABORATORY ACTIVITIES THAT WILL BE NEEDED WHEN A CRISIS OCCURS."<sup>ii</sup>

The response by laboratory directors paints a chilling portrait of laboratories unprepared for a terrorist attack while being overwhelmed by the new demands placed upon them. The shortcomings identified include the following:

**1. Lack of clear direction and formal coordination between emergency responders.**

- Directors reported they have received no clear direction from any federal agency or other authority defining their role and function.

**2. Decision-making based on inadequate information.**

- Directors said that, based on the resources readily available to them, their instructions to emergency workers would be based on little more than a “best guess.” As one laboratory director responded: “[The first emergency responders] would want to send samples to the public health labs as they do now with suspected bioterrorism samples. However, our chemical capabilities are questionable.”

**3. Limited capacity for environmental testing.**

- Beyond ongoing environmental health hazards, such as mercury, lead, and Polychlorinated Biphenyls (PCBs), directors said that SPHLs have little ability to test a much wider range of potentially harmful chemicals including those most likely to be used in a terrorist assault, such as nerve agents, blister agents, and incapacitating agents. (See Table I)

**4. Minimal ability to test human samples.**

- Laboratory directors and others report that no SPHL can currently test human samples (blood, urine, and saliva, etc.) for blister agents, incapacitating agents,

nerve agents, riot control tear gas, or vomiting agents. Only two state laboratories have the capacity to test for biotoxins (such as ricin), and only one can test for blood agents, caustics (including acid), and choking or lung agents (such as chlorine or cyanide). (See Table I)

**5. Lack of planning, protocols, and surge capacity needed in the event of emergency.**

- Directors also add there are virtually no plans or protocols in place to assure that their facilities can access additional help and resources on an immediate basis.

**6. Lack of equipment and training required to safely handle and store samples of suspect biological or chemical agents.**

- Directors report that their physical plant and equipment are often outdated and in disrepair. As a result, many facilities are not only incapable of environmental and human testing, they cannot even properly store samples.
- Compounding this shortcoming is that laboratory personnel often lack sufficient training to properly handle suspected agents.

**7. Lack of security and safeguards against exposure of laboratory personnel and emergency responders.**

- Directors expressed concern for worker and facilities safety, particularly because in an emergency, SPHLs could house samples of highly toxic chemicals or infectious diseases.

**Table I: Laboratory Capacity to Test for Potential Chemical Agents: Summary of Five State Laboratory Directors' Responses**

Chemical Agents	Lab Capability To Test		Lab Capability to Send Sample to CDC
	Environmental Sample	Clinical Sample	
Biotoxins (e.g. ricin)	2 of 5	2 of 5	5 of 5
Blister Agents/ Vesicants (e.g. mustard gas)	0 of 5	0 of 5	4 of 5 and 1 possible
Blood Agents (e.g. arsine)	1 of 5	1 of 5	4 of 5 and 1 possible
Caustics (acids)	2 of 5	1 of 5	4 of 5 and 1 possible
Choking/ Lung/ Pulmonary Agents (e.g. chlorine and cyanide)	3 of 5	1 of 5	4 of 5
Incapacitating (e.g. phenothiazines)	0 of 5	0 of 5	4 of 5
Metals (e.g. arsenic and mercury)	4 of 5	1 of 5 and 1 possible and 1 limited	5 of 5
Nerve Agents (e.g. VX, Sarin)	0 of 5	0 of 5	4 of 5
Riot Control/ Tear Agents	1 of 5	0 of 5	4 of 5
Vomiting (e.g. DM, DA, DC)	1 possible	0 of 5	4 of 5

\* Based on survey conducted April 2003. Environmental samples = air, soil, or water. Clinical samples = blood, urine, or saliva.

## Part II: State-by-State Chemical Sample Assessment

TFAH's assessment of just three of the over 60 toxic substances that CDC has identified as potential chemical weapon agents found that, while vast amounts of these chemicals are in industrial use across the country, laboratories have an extremely limited capacity to test for them. In some cases, they can't test at all. Even casual exposure to these substances can result in breathing difficulties, coma or death. In the wake of a terrorist

attack, rapid identification of these and other chemicals is critical to determining the correct measures for their containment and the treatment of victims. Overall, they would be largely dependent on a system that would involve shipping samples for testing to CDC for analysis and waiting for results. Currently, the CDC does not have the capability to test clinical samples for two of the chemicals examined: phosgene and arsine.

**Table II: State Chemical Testing Capacity Study Results**

Chemical	Type of Agent	Examples of Commercial Uses	Number of States Where Used Commercially	Number of State Labs Able to Test for the Chemical in Human Samples
Arsine	Blood Agent	Manufacturing of computer chips and fiber optics	23 states and 1 U.S. territory	None
Cyanide-Based Compounds	Toxic Agents	Electroplating, metallurgy, photographic development, ship fumigating, wastewater treatment	41 states and 1 U.S. territory	1 state and the CDC currently, 5 more expected to have capability by next year
Phosgene	Choking Agent	Pesticides, herbicides, pharmaceuticals, metal welding, dye manufacturing	11 states	None

\* For state by state breakdown, see Appendix B in full report.

## RECOMMENDATIONS:

# A Plan Needed for Bio-Chemical Response

To prepare our nation to better respond to the clear and growing threat of biological and chemical terrorism, TFAH believes that America's system of public health laboratories must be strengthened. We urge the following action:

### MODERNIZING STATE PUBLIC HEALTH LABS

As a first step, by 2004, CDC, in collaboration with the Association of Public Health Laboratories, must develop minimum requirements for state laboratories to ensure basic protections for all citizens. These should include meeting the following goals:

- **Improved Capacity:** By the end of 2004, each state should have at minimum testing capabilities for priority potential chemical and biological weapons agents.
- **Modern Communications:** All state public health laboratories must establish an effective communications network incorporating clinical laboratories, hospitals and private labs that evaluate patients directly.
- **More Expertise:** Each state laboratory should have at least two trained PhD-level microbiologists and one PhD-level chemist to ensure effective biological, chemical and environmental testing capacity.
- **Bolstered and Stable Funding:** To be prepared for future emergencies, laboratories must have a strong and reliable funding base. States must provide a minimum 40% of laboratory budgets to ensure proper capacity.

### A NEW FEDERAL COMMITMENT AGAINST BIO-CHEMICAL TERRORISM

A federal commitment is needed now to develop the nation's response strategy for a potential chemical weapon and/or radiological attacks. This requires:

- **Investing in Safety.** For three years, beginning in FY 2004, the federal budget must include \$200 million to enhance federal and state public health laboratories' capabilities. This funding is essential if they are to have the ability to conduct clinical testing for potentially dangerous chemicals, such as ricin, cyanide, nerve agents and pesticides. After this period, laboratories should be sustained at a level of approximately \$100 million per year.
- **CDC Taking the Lead.** CDC must have the authority to ensure capacity, collaboration and consistent methodology for clinical testing for chemical exposures. The National Center for Environmental Health should be supported to advance methodologies, develop a training system and establish performance measures for state laboratories. The Department of Homeland Security (DHS) must partner with CDC and Environmental Protection Agency (EPA) to prioritize chemical agents for environmental and clinical laboratory methodologies.

- **Joint Training.** Key federal agencies including DHS, EPA, and CDC must collaborate to develop a joint training exercise with states and first responders to prepare for chemical attacks. The May 12, 2003 “Topoff 2” emergency response exercise had components to examine nuclear and biological threats, but did not include a chemical scenario. To date, there has not been a substantial train-

ing exercise to test national and local readiness in the event of such an attack.

- **Ensuring Double Duty.** To maximize their value, biomonitoring measures should be fully integrated into the nationwide health tracking network to strengthen public health investigations of chronic disease and environmental risks.

## Endnotes

<sup>i</sup> The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 required that the \$1 billion in appropriated funds be used exclusively for bioterrorism, and not chemical terrorism, related activities. White House Press Release. 2002. President Signs Public Health Security and Bioterrorism Bill. Washington, DC: The White House. The new bioterror funding guidelines issued by U.S. Secretary of Health and Human Services Tommy Thompson on May 9, 2003 begin to address this gap: improving laboratory capacity for handling chemical agents was included as one of the seven areas of focus. Information on the risk for a chemical terrorist attack can be found in: U.S. GAO. 2003. Homeland Security: Voluntary Initiatives Are Under Way at Chemical Facilities but the Extent of Security Preparedness is Unknown. Washington, DC: U.S. General Accounting Office.

<sup>ii</sup> Becker S. 2003. Executive Director’s Note. The Association of Public Health Laboratories Minute. March-April: 3.

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#### THE FULL REPORT

### “PUBLIC HEALTH LABORATORIES: UNPREPARED AND OVERWHELMED”

IS AVAILABLE ON THE TFAH WEB SITE:

[WWW.HEALTHYAMERICANS.ORG](http://WWW.HEALTHYAMERICANS.ORG)

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