



**Homeland
Security**

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S&T Stakeholders Conference

A Bioforensics Case Study: ConOps in Action

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Overview

- Welcome/introductions
- Training objectives
- Scenario overview
- Bioforensics Process
- Team member roles & responsibilities
 - Hq FBI Weapons of Mass Destruction Operations Unit (WMDOU)
 - FBI Hazardous Material Response Unit (HMRU)
 - FBI Chemical Biological Science Unit (CBSU)
 - National Bioforensics Analysis Center (NBFAC)
 - Public Health (CDC, NYC DOH)
- Discussion



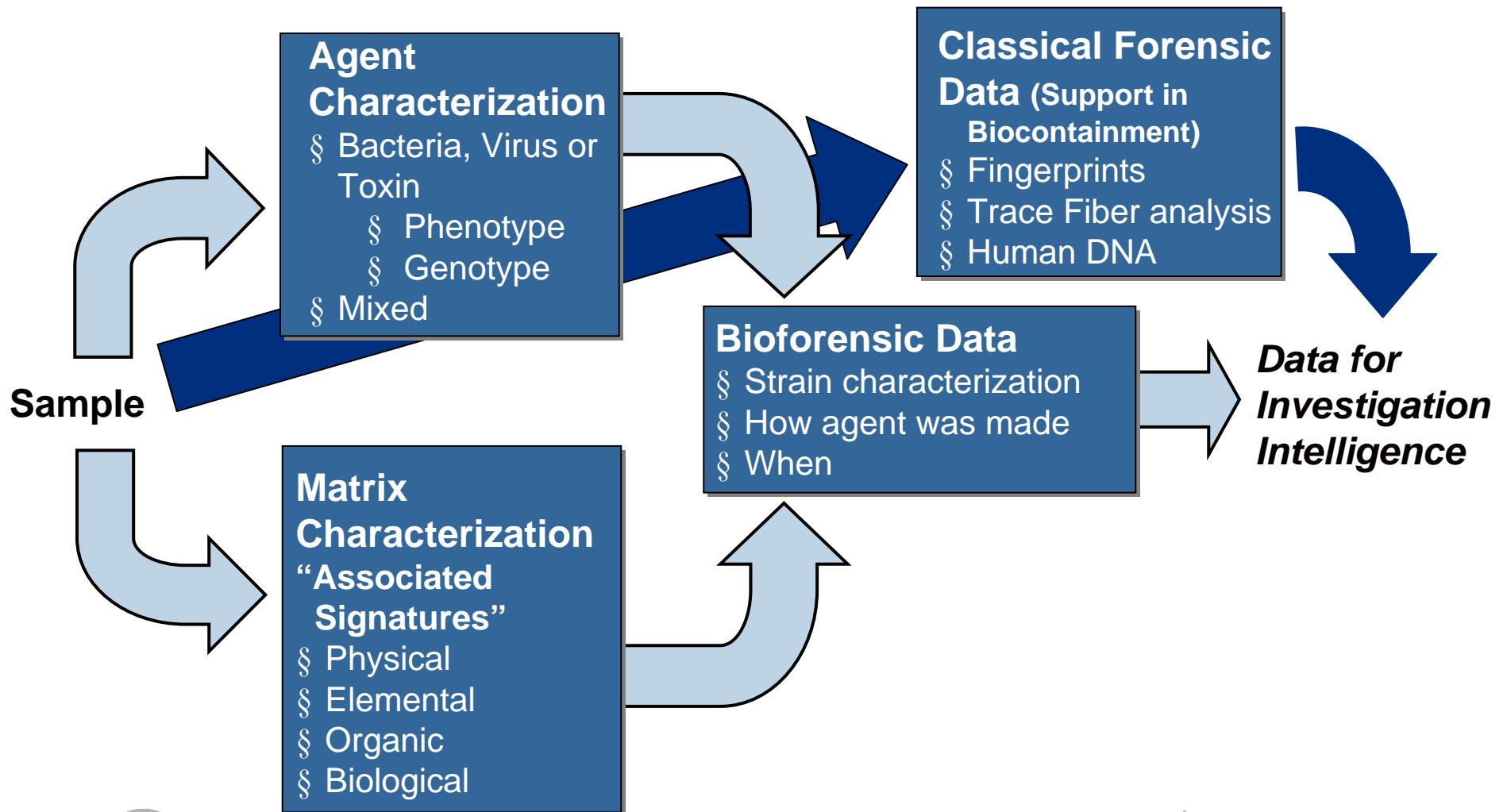
Training Objectives

- Understand WMD event coordination
- Understand key federal organizations and roles in a bioterror criminal investigation
- Understand the capabilities of the NBFAC in highly specialized microbial forensics analysis
- Understand the processes of traditional forensics in a bio-contaminated environment

Scenario Background

- Aerosol release of the pathogen *Francisella tularensis* causative agent of disease Tularemia
 - Zoonotic
 - Headache, chills, fever, dizziness, sweating, potential pneumonia
 - Incubation period: 1-21 days (avg 3-5)
- BioWatch monitor filter capture
- LRN confirms + Ft release from subway station filter
- WMD event coordination starts – WMDOU conference call
- Epidemiological & Criminal investigation in parallel
- Evidence to NBFAC for specialized forensics analysis
- Case reporting

Bioforensic Analytical Process



Team Member Roles

- HQ FBI Weapon of Mass Destruction Operations Unit (WMDOU)
- FBI Hazardous Material Response Unit (HMRU)
- FBI Chemical Biological Science Unit (CBSU)
- National Bioforensics Analysis Center (NBFAC)
- Public Health (CDC, NYC DOH)





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Scenario

Day	Events
1	A NYC Department of Health LRN laboratory reports to CDC that a filter collected at a NYC subway station (“Times Square”) has tested positive for <i>Francisella Tularensis</i> . The hit is close to the BioWatch Action Response threshold, but because of previous experiences with urban <i>F. tularensis</i> positives an untested portion of the filter is sent to a CDC reference laboratory for confirmation. to alert CDC issues medical surveillance alert for tularemia to NYC area physicians
	A National BioWatch Conference Call is convened to alert NYC, FBI, DHS and EPA officials of the hit, and to perform informal threat and public health risk assessments. It is agreed to close the station in question and prepare for further sampling, but to wait for confirmation from the reference lab before initiating more extensive actions.
	CDC issues medical surveillance alert for tularemia to NYC area physicians.
2	The reference laboratory confirms the finding of <i>F. tularensis</i> . The magnitude of the PCR test results, the indoor venue of the filter collection, and the lack of any other environmental hits in the NYC area all point to a localized, non-natural release of the agent.
	The FBI Weapons of Mass Destruction Operations Unit initiates a conference call to coordinate the investigative response. HMRU and CDC agree upon a joint sampling plan for Times Square station. A portion of the original BioWatch filter is sent to NBFAC for analysis as forensic evidence. With the cooperation of MTA authorities, video records from cameras located in the Times Square subway station are sequestered for review. Although no additional BioWatch hits are reported, the remainder of the MTA subway system is shut down pending public health investigation.
3	A patient (“patient 0”) registers at the emergency room of the Bronx-Lebanon Hospital in New York City with a 103° fever, chills, severe headache, dry cough, and chest pain. Onset of symptoms was sudden, 1 day prior. CDC is notified, and sputum and throat swab samples sent directly to CDC for analysis.
	Environmental sampling of the Times Square station, and review of surveillance tapes is underway. Samples are collected as forensic evidence and transported by HMRU to NBFAC for analysis.

3	NBFAC confirms strong PCR detection of <i>F. tularensis</i> in filter sample; prepares for analysis of incoming samples from HMRU.
4	During review of the surveillance camera footage suspicion focuses on a particular individual with a backpack who is persistently present on the platform for several hours without boarding a train. Several frames containing clear facial features of this individual are forwarded to the National Counter Terrorism Center (NCTC).
4	NBFAC reports several positive detections of <i>F. tularensis</i> among the samples collected at Times Square station.
4	3 new patients possibly infected with <i>F. tularensis</i> identified at three separate New York City area hospitals
5	The CDC reference laboratory reports successful culturing of an isolate of <i>F. tularensis</i> from patient 0's sputum and throat swab samples. Patient 0 has not had any close contact with wild or domestic animals, has not traveled outside NYC within the last 3 months, however does confirm presence at Times Square station early in the morning of Day 1.
5	During the WMDOU conference call, CDC agrees to send an isolate from patient 0 to NBFAC for further genetic characterization. In addition, genetic material from the patient 0 isolate is sent to NBFAC spoke lab at NAU for genotyping.
5	Diagnosis of tularemia is confirmed for the 3 new patients identified on day 4; additional suspected cases are identified at various emergency rooms and doctor's offices in the NYC area.



6	NBFAC begins culturing and preparation of DNA from the patient 0 isolate for genetic sequencing.
6	NCTC tentatively identifies the man from the surveillance tapes as a known associate of persons within the U.S. who are subjects of a counterterrorism surveillance effort. The FBI's New York field office is able to locate the apartment of the suspect, and obtains a warrant to search the apartment. Because of the potential biological threat, the search will be executed with HMRT personnel.
7	The NAU spoke lab reports typing results for the patient 0 isolate. MLVA typing places the isolate in the SCHU S4 clade; At NBFAC, genetic sequencing is underway.
7	At the daily WMDOU telecon, it is recognized that the typing results strongly imply a laboratory source of the subway isolate; the FBI requests a list of U.S. and foreign laboratories that possess the SCHU S4 isolate from the CDC Select Agent Program.
7	Additional patients with tularemia identified, and epidemic investigation interviews are taking place; Extensive environmental sampling of <i>other</i> subway stations and trains has been underway since day 2, with no positive hits, implying that only the Times Square station was involved in the attack.
7	FBI agents with assistance from HMRT personnel search the suspect's apartment and question neighbors and known associates. The suspect has disappeared. Objects found in the apartment are bagged as evidence and sent to NBFAC for traditional (fingerprint and human DNA evidence) and microbial forensic analysis; swipe and vacuum samples are obtained, and sent to NBFAC for microbial analysis. Among the seized materials are two with particular significance. The first is a backpack that contains a small (≈ 500 ml) cylinder connected to a medical nebulizer equipped with batteries and a timer. The second is several unlabeled vials found in the suspect's freezer which appear to contain small amounts of frozen liquid.
8	24 additional patients infected with <i>F. tularensis</i> have been identified; one of these is diagnosed in Chicago, but has just returned there from a trip to NYC. All infected patients so far can be placed at the Times Square-42 nd Street station during the morning of day 1, and most can be located at the platform where the man with the backpack was observed.
	NBFAC reports positive PCR detection of <i>F. tularensis</i> from the liquid samples contained in the vials seized from the suspect's apartment, the interior of the cylinder and nebulizer found inside the backpack, and on 11 of 131 additional samples obtained in the search. More significantly, isolates have been cultured from the vials (but not



11	FBI trace evidence examiners working at NBFAC report that a number of fingerprints have been collected from the device found in the backpack from the suspect's apartment.
23	For the first time since day 4, no additional patients infected with <i>F. tularensis</i> have been identified. All 49 patients to date either entered the subway system or changed trains at the Times Square-42 nd Street station between 5am and 9am during day 1. Most of the victims can be placed on the subway platform where the man with the backpack was observed.
	At the FBI's request, the CDC obtains samples from 3 tularemia patients from western states who were reported earlier in the year. The samples are sent to NAU for typing and to NBFAC for possible sequencing.
30	<p>NBFAC and the LRN laboratories complete PCR analysis for the presence of <i>F. tularensis</i> on all high priority case-related evidence samples. This includes:</p> <ul style="list-style-type: none"> • Swipe and vacuum samples taken from the subway • Evidence obtained in the apartment search, • Certain clinical samples from infected patients <p>All samples match at the MLVA strain typing level; The 3 isolates from the western state's tularemia cases are shown to type to the Colorado 2000 clade, which is genetically relatively distant from SCHU S4. The whole genome sequence of the patient 0 isolate has been compared to reference sequence of SCHU S4 and found to differ at only 3 loci. Reference samples from a number of US and foreign laboratories have been obtained, and are being sequenced for comparison to the subway isolate.</p>

30 +	No other infections associated with the subway release have been reported since day 23. The CDC has begun study of antibody responses of NYC subway riders in an attempt to estimate the number of people exposed during the incident. 48 of the 49 people known to be infected in the incident survived, the one death being an immunocompromised HIV-infected individual.
	The suspect was apprehended attempting to cross into Canada at Niagra Falls. He refuses to say anything to law enforcement officials even in the presence of a court-appointed lawyer. A blood test revealed high titer of antibodies to <i>F. tularensis</i> .
	The FBI interviews the infected patients as well as other potential witnesses whose presence on or near the subway platform during the early morning of day 1 could be ascertained. Two of these are able to corroborate the presence of the suspect.
	Although fingerprints obtained from the suspect matched several of the fingerprints found on the cylinder from the backpack, at least one clear print found on the battery does not match any of the suspect's prints, or those of the HMRU or HEAT examiners, or any member of the NBFAC team that originally inspected the device, and it does not have a database match.
	The FBI continues to follow leads that will help identify the other conspirators in the Times Square station incident.

