

Anthrax Event, 2001: A Case Study Report

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Introduction: The anthrax attack during the Fall of 2001 (7 days after 9/11), was a biological event with extensive ramifications. 5 letters containing the toxic spores were mailed to two U.S. senators in Washington, D.C., to a *newspaper* and journalist in New York City, and to a media office in Florida. The handling of the contaminated mail put 10,000 people at risk. A total of 22 postal service employees contracted the spores, and 5 died as a result from the exposure. The FBI concluded that the man-made attack was carried out by Dr. Bruce E. Ivins, who was an expert researcher working at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), with access and ability to harvest and create purified anthrax spores, including the strains identified on the letters involved in the event.

Facts of the Case: The total number of USPS workers exposed was 22 out of which 11 contracted the spores via inhalation, and the other 11 through the cutaneous route.¹ The 5 fatalities reported contracted the anthrax spores via inhalation. 2 of those who died were from the Brentwood post office in Washington, D.C. A total of 10,000 people were considered at risk at the time, but only 30 people tested positive for anthrax spores and were treated with antibiotics.¹ The expansive investigation led to the formation of the Amerithrax task Force, which combined the expertise of the Federal Bureau of Investigation (FBI) and the U.S. Postal Inspection Service (USPIS). The investigation lasted 7 years and expanded to New York, New Jersey, Connecticut, Florida, and the District of Columbia.¹ Samples were taken from the 5 letters mailed to the different recipients to identify the anthrax strain used and compared to strains from various laboratories. The investigation employed conventional investigative resources and innovative methods to identify those responsible for the attack.² Scientific analyses of the mailings, clinical, environmental, and laboratory samples were carried to identify the origin of anthrax strain. The estimated cost of the attack was \$320 million dollars.³ This includes decontamination costs, sampling cost, and relocation of services and employees.³ The reach of the event caused significant disruption and relocation of mail distribution centers, congressional office buildings, and other sites.³

Epidemiology: Anthrax is a rod-shaped bacterium, *bacillus anthracis*, that occurs naturally and can live inactivated in soil for decades or even centuries.⁴ The dangerous spores can be passed to livestock, get activated, and multiply. Once activated, anthrax releases toxins that can lead to illness and death.⁴ The spores can be transmitted by inhalation (most lethal), cutaneous, injection (subcutaneous), and ingestion of water or food contaminated with the spores. People at risk include Persons working with livestock and related animal products: Wool, hides, or hair. Other at-risk people include veterinarians, agricultural workers, first responders, mail workers, and hospital workers.⁵

The magnitude of the attacks of 9/11 put stress on the FBI's ability to coordinate testing and handling of the anthrax strains. This led the FBI to contract scientists and experts outside of the agency to conduct the analysis.² The Ames anthrax strain was the strain found on letters involved in the event. This is a rare strain that has been found in Texas, and it is most widely distributed among laboratories. 20 laboratories were subpoenaed by the FBI and given a protocol on how to prepare and submit the anthrax samples to the agency.² 3 of those labs asked for samples were located in Canada, United Kingdom, and Sweden (only 2 provided samples). A total of 1,070 samples of stock derived from the Ames strain of anthrax bacillus were received. 11 of those samples were deemed not viable (failed to grow the Ames strain or anthrax bacillus).² Therefore, only 1,059 samples were screened and results were reported for either the presence or absence of four mutant genotypes of the Ames strain found on the letters sent during the attacks. Only 947 samples were found to have the mutant genotype of the Ames

strain (RMR-1029).² Because there was no required reporting from laboratories of their possession of [Select Agents](#), (including anthrax), It was unknown which laboratories worldwide possessed the Ames strain (including terrorist groups operated laboratories). So, the FBI directed the subpoenaed laboratories to provide the entire stock population of samples of the strain, instead of requesting samples at random from a portion of the population of interest.² There were doubts about the compliance from laboratories in question in regards to the complete submission of their samples, transfer of samples between facilities, and destruction of samples. Raising the question of whether the samples submitted were representative of the strain in question. However, the Chi-square test calculations (independence test) were performed under the assumption of independence among the 1,059 samples.² Therefore, the results have serious issues of validity, as many of the samples were not independent due to mixing of samples among some of the laboratories in question prior to the event.² Due to the dependent nature of these samples, natural evolving relationships between the samples could not be drawn. One genotype mutation of interest was the RMR-1029, which was determined to have come from the USAMRIID. Statistical analysis was employed to assess specificity and sensitivity. RMR-1029 and another sample of interest were diluted to assess for sensitivity, but there were significant variations between the samples.² The validity of the specificity test is also under question, as there was a reported discrepancy for one of the samples initially marked to have grown all genotypes in question, but later on, it was reported as no growth for some of those samples.² Therefore, the potential for false negative results could not be excluded. The RMR-1029 sample showed a significant relationship with the samples obtained from the letters used during the attacks. However, the strength of association could not be quantified.²

Management of the Event: The anthrax event exposed the inadequacy of the public health system to address this biological event. The CDC made a proposal to congress to update the public health infrastructure to improve gaps in the public health force of local, state, and federal governments.⁶ But the proposal was not approved until after the anthrax attack.⁶ Therefore, the CDC found itself ill prepared to mount a coordinated response with local and state health departments. The system operated on a business hour schedule with little capacity to act efficiently during surges related to an emergency.⁷ The hospital system lacked the ability to increase surge capacity, as there was no emergency preparedness plan that coordinated efforts with other hospitals. Physicians had a hard time diagnosing the multitude of symptoms of inhaled anthrax with which patients were presenting. In addition, laboratories lacked capacity to test thousands of samples.⁶ As a result of the attack, the Department of Health and Human Services created the Office of Public Health Emergency Preparedness (OPHEP) providing funding to hospitals and health departments for bioterrorism planning.⁷ The Pandemic and All-Hazards Preparedness Act of 2006 replaced the OPHEP. The Strategic National Stockpile (SNS) to provide supplies, medicines, and equipment to hospitals during an emergency was born from the event as well.⁷

Communication: One of the major takeaways was the inability of public health to properly communicate population risk after the anthrax exposure. Information was not provided in a timely and clear manner and messages given to the public were poorly coordinated among officials⁸. This made room for misinformation and panic.

Summary: The 2001 anthrax event showed that emergency preparedness is a fundamental function of public health and underscored the importance of maintaining a well-prepared public health system, including adequate funding, so it is allowed to continue basic core functions of protecting the public during a crisis. The events of 9/11 placed severe stress on the system which affected the public response and resources needed for effective coordination.

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