Inhalation Anthrax Associated with Dried Animal Hides — Pennsylvania and New York City, 2006

On February 21, 2006, the Pennsylvania Department of Health (PDOH) reported to CDC and the New York City (NYC) Department of Health and Mental Hygiene (DOHMH) a case of inhalation anthrax in a man who resided in New York City. This report summarizes the joint epidemiologic and environmental investigation conducted by local, state, and federal public health, animal health, and law enforcement authorities in Pennsylvania and NYC to determine the source of exposure and identify other persons who were potentially at risk.

On February 16, the patient had traveled from NYC to northern Pennsylvania for a performance with his dance troupe. He collapsed later that evening with rigors and was admitted to a local hospital, where he reported a 3-day history of shortness of breath, dry cough, and malaise. A chest radiograph revealed bilateral infiltrates and pleural effusions.

On February 17, the patient was transferred to a tertiary care center because of worsening respiratory status. All four blood culture bottles grew gram-positive rods. Isolates were sent to the PDOH laboratory and confirmed on February 21 as *Bacillus anthracis* by polymerase chain reaction and susceptibility to lysis by gamma phage. On February 22, CDC identified the isolate as *B. anthracis* genotype 1 by multiple-locus variable-number tandem repeat analysis (*1*). Isolates were susceptible to all antimicrobials tested. Preliminary anti-protective antigen (PA) antibody testing by enzyme-linked immunosorbent assay was below the lower limit of quantification of the assay (*2*), consistent with early infection. Anti-PA IgG was detectable in the patient's plasma on February 22 and reached a four-fold elevation above the assay reactivity threshold by February 23, thus confirming seroconversion. As of March 14, the patient remained hospitalized in Pennsylvania.

The joint epidemiologic and environmental investigation sought to 1) determine the source of exposure, 2) identify other persons who were exposed and required postexposure prophylaxis, 3) enhance surveillance for additional cases through outreach to the medical community, and 4) provide frequent updates as soon as available and consistent messages regarding risk to the public.

Interviews were conducted with the patient, his family, and his colleagues. The patient made traditional African drums by using hard-dried animal hides (e.g., air-dried until brittle enough to crack) obtained in NYC from importers who primarily sold African goat and cow hides. Making the drums involved soaking hides for 1 hour in water and then scraping hair from the hides with a razor, which reportedly generated a large amount of aerosolized dust in the patient's workspace as the hides dried. The man did not wear any personal protective equipment (e.g., mask or gloves) while working. After working on the hides, he usually returned home to his apartment and immediately removed his clothing and showered.

On December 20, 2005, after a 3-week trip to Côte d'Ivoire, the patient returned to NYC with four hard-dried goat hides wrapped in a plastic bag. He transported them in his van to his storage facility workspace, a windowless unit (12 ft x 10 ft x 30 ft) with no operating air conditioning or window ventilation. The man did not take the hides to his home. He worked on the last of these hides on February 12, 2006, and cleaned the workspace on February 15.

To confirm the hypothesis that the primary source of exposure to aerosolized *B. anthracis* spores occurred in the workspace and to determine whether the patient's home and van were contaminated, a targeted environmental evaluation was conducted by CDC and NYCDOHMH. Surface wet swab, wet wipe, and vacuum samples were obtained at locations selected to maximize the possibility of detecting *B. anthracis* spores in the patient's residence, van, and workspace. Samples were sent to NYCDOHMH and CDC laboratories, both of which confirmed the presence of *B. anthracis* by culture and polymerase chain reaction; samples sent to CDC were identified as genotype 1 by multiple-locus variable-number tandem repeat analysis. All samples from the workspace were positive for *B. anthracis*, including those from an inactive air conditioning vent 12 feet above the floor. Consistent with secondary contamination, some samples from the patient's apartment (e.g., shoes and entryway) and van (e.g., floorboard) tested positive for *B. anthracis*; others were negative (e.g., most surfaces above ground level). Environmental and epidemiologic findings suggested that the patient's primary exposure to aerosolized *B. anthracis* spores resulted from scraping a contaminated hide in his workspace.

Postexposure prophylaxis for inhalation anthrax was recommended for four persons who had been present in the patient's workspace during procedures that generated aerosols from the animal hides and hair (e.g., mechanical hide manipulation with a razor or sweeping/vacuuming of hairs). As of March 14, interviews and enhanced surveillance had not identified additional cases of suspected or confirmed anthrax. NYCDOHMH provided regular updates on the status of the investigation and informed the public that other persons in the patient's apartment building or the storage facility where the patient's workspace was located had no risk of contracting inhalation anthrax.

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Editorial Note: This report describes the first case of naturally acquired inhalation anthrax in the United States since 1976 (*3*). Coordinated epidemiologic and environmental investigations and laboratory analyses indicated that the likely source of infection for this patient was exposure to *B. anthracis* spore–containing aerosols produced by mechanical scraping of a contaminated animal hide in a nonventilated workspace.

B. anthracis spores are present in soil in much of the world, causing infection in herbivorous mammals (e.g., cattle, sheep, goats, or antelope) when they ingest spores from soil. Anthrax can occur in humans exposed to infected animals or tissues such as hides or fur. Anthrax in humans takes one of three forms: cutaneous, gastrointestinal, or inhalation.

Industrial processing of animal hair or hides accounted for 153 (65%) of 236 anthrax cases reported to CDC during 1955–1999 (CDC, unpublished data, 2001). Commercial products made from animal hair or hides accounted for an additional five (2%) cases. The majority of these 158 cases were cutaneous anthrax; only 10 (6%) cases were inhalation anthrax. Improvements in industrial hygiene and introduction of practices such as improved ventilation, decreased use of imported animal materials, and vaccination of at-risk workers helped limit the incidence of industrial inhalation anthrax (*4,5*). In contrast, anthrax associated with the handling of individual animal hides is rare (*4*). One case of cutaneous anthrax reported in the United States was associated with a goat hide drum purchased in Haiti (*6,7*). No reported cases of inhalation anthrax in the United States have been associated with finished animal hide drums.

The U.S. Department of Agriculture regulates the importation of animal products, including animal hides,* although these regulations are not specific to, nor are, in general, the hide import disinfection procedures evaluated for, *B. anthracis*. The safest way to eliminate risk for inhalation anthrax from animal hides or hair is to work only with hides that have been tanned or otherwise treated to render *B. anthracis* spores nonviable. Air drying does not destroy *B. anthracis* spores. If hard-dried hides are used, certain precautions can minimize but not necessarily eliminate exposures to *B. anthracis*, including 1) regularly washing hands thoroughly with soap and warm water, 2) wearing durable protective gloves and a designated pair of shoes in the workspace, and 3) working in a well-ventilated workspace. Spores on hides and tools can be inactivated by heating them to an internal temperature of 158°F (70°C) or by placing them in boiling water for ≥30 minutes (*8*). Clothes worn during work should be removed before leaving the workspace and laundered. The workspace should be cleaned using a high-efficiency particulate air vacuum. Workers should avoid vigorously shaking or beating hides, dry sweeping, using compressed air, and working in areas where other persons might be present. CDC does not routinely recommend prophylaxis for persons who have had contact with animal hide drums or animal hides. Drum makers, drum owners, or drummers should report new skin lesions or serious respiratory illnesses to their health-care providers and describe any contact with animal hide drums or animal hides.

A priority for local, state, and federal agencies involved in this investigation was providing updates on the investigation as soon as available and frequent outreach to the public and medical community and to persons who resided in the patient's apartment building or worked at the storage facility. Risk communication emphasized the patient's natural exposure, the rarity of inhalation anthrax, and that exposure risk was limited to persons in the patient's workspace during aerosol-generating procedures. Risk messages also highlighted the absence of any documented risk for inhalation anthrax from environmental contamination of the patient's apartment and workspace, playing or owning African drums, or attending African dance performances.

After the initial diagnosis of inhalation anthrax was made, the rapid epidemiologic response and environmental investigations by public health, animal health, and law enforcement authorities contributed to a prompt understanding of the patient's exposure and possible risk to others. The coordinated responses were critical to minimizing risk for exposure and infection and alleviating concern among the public.

* 9CFR Part 95; available at http://www.access.gpo.gov/nara/cfr/waisidx_05/9cfr95_05.html.

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Hypothermia-Related Deaths — United States, 1999–2002 and 2005

Hypothermia, defined as a core body temperature of <95°F (<35°C), is preventable. Excessive exposure to cold temperatures leads to potentially fatal central nervous system depression, arrhythmias, and renal failure (*1*). Advanced age, chronic medical conditions, substance abuse, and homelessness are among risk factors for hypothermia-related death. This report describes three hypothermia-related deaths that occurred during 2005 and reviews CDC data on hypothermia-related deaths during 1999–2002 in the United States. Public health strategies should target U.S. populations at increased risk for exposure to excessive cold and recommend behavior modification (e.g., dressing warmly, modifying activity levels, or avoiding alcohol) to help reduce mortality and morbidity from hypothermia.

Case Reports

Wyoming. In May 2005, the body of a man aged 44 years from Florida was found in Wyoming, close to a cabin, where his all-terrain-vehicle had become mired. He had rigor mortis and was pronounced dead at the scene. The man had no known medical history; however, an autopsy revealed cocaine and cannabinoids in his blood. He was partially dressed in a pullover, T-shirt, pants, and one sock. Temperatures on the preceding day ranged from 30°F to 38°F (-1°C to 3°C). The coroner certified cause of death as hypothermia resulting from exposure to cold temperatures while acutely intoxicated.

New Mexico. In November 2005, the body of a woman aged 59 years was found in a field near her home in New Mexico. She was pronounced dead after attempts to revive her at a local emergency department were unsuccessful. She had a medical history of diabetes and chronic alcoholism. An autopsy revealed a vitreous humor glucose level of 410 mg/dL and a femoral blood alcohol concentration of 0.175 g/dL, more than twice the legal intoxication limit (0.08 g/dL) in New Mexico. The woman was dressed in light clothing and one shoe; her wool jacket and other shoe were found nearby. The night before the woman was found, the ambient temperature was 0°F (-18°C). The medical examiner certified cause of death as hypothermia resulting from exposure to excessive cold while acutely intoxicated.

Alaska. In November 2005, the body of a man aged 59 years was found seated, frozen solid, at a table in his home (a converted bus) in Alaska. He was pronounced dead at the scene; he had no known medical conditions. He was inside a sleeping bag and was wearing a light jacket, long-sleeved flannel shirt, T-shirt, and pants. The temperature inside the bus was -15°F (-26°C), and the oil in the heater tanks was exhausted. The medical examiner certified the cause of death as hypothermia resulting from exposure to excessive cold.

Risk Factors for Hypothermia-Related Mortality

During 1999–2002, a total of 4,607 death certificates in the United States had hypothermia-related diagnoses listed as the underlying cause of death or nature of injury leading to the underlying cause of death (annual incidence: four per 1,000,000 population). Exposure to excessive natural cold (*International Classification of Diseases, Tenth Revision* [ICD-10] code X31) was the underlying cause in 2,622 deaths. Hypothermia (ICD-10 code T68) was the nature of injury in 1,985 deaths with underlying causes of death other than exposure to excessive natural cold (e.g. falls, atherosclerotic cardiovascular disease, or drowning).

During 1999–2002, among those who died from hypothermia, 49% were aged ≥65 years, 67% were male, and 22% were married (compared with 52% of the overall U.S. population) (*2*). A high proportion (83%) of the hypothermia-related deaths occurred during October–March (Figure 1);

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Primary and Secondary Syphilis — United States, 2003–2004

In 2000, the rate of primary and secondary (P&S) syphilis in the United States was 2.1 cases per 100,000 population, the lowest since reporting began in 1941. From 2001 to 2004, the P&S syphilis rate increased to 2.7, primarily as a result of increases in cases among men who have sex with men (MSM). To characterize the recent epidemiology of syphilis in the United States, CDC analyzed national notifiable disease surveillance data for 2000–2004, focusing on 2003–2004.* This report describes the results of that analysis, which indicated that the disparity between syphilis rates among blacks and whites† in 2004 increased for the first time since 1993 and is associated with a substantial increase of syphilis among black men. Syphilis rates continue to increase among MSM. After declining for 13 years, the rate of P&S syphilis in 2004, compared with 2003, increased in the South§ and remained the same among women. The findings underscore the need for enhanced prevention measures among blacks and MSM. In addition, enhanced surveillance is needed to detect any early increases in P&S syphilis among women.

CDC analyzed surveillance data reported weekly from health departments nationwide during 2000–2004. Data included patient demographics (i.e., age, sex, race/ethnicity, and county of residence) and stage of syphilis. Data on P&S syphilis were analyzed because these cases represent incidence (i.e., newly acquired infections within the specified period). P&S syphilis rates were calculated using population denominators from the U.S. Census Bureau (*1*). Because states do not routinely report information on sexual practices or sex of sex partners, male-to-female (M:F) rate ratios were used as a surrogate measure to monitor occurrence of syphilis among MSM and were calculated by dividing the male case rate by the female case rate for a specified period. M:F rate ratios in excess of 1:1 suggest male-to-male transmission.

From 2000 to 2004, the number of cases of P&S syphilis increased from 5,979 to 7,980, and the rate increased from 2.1 to 2.7 cases per 100,000 population. Of the 7,980 cases of P&S syphilis reported in 2004, approximately 84% (6,722) occurred among men. The rate of P&S syphilis among men increased from 2.6 to 4.7. Among women, the rate of P&S syphilis decreased from 1.7 to 0.8 from 2000 to 2003 and remained at 0.8 in 2004, the first time since 1991 that the rate among women did not decrease. The M:F rate ratio increased steadily from 1.5 in 2000 to 5.3 in 2003, but the

*Data for 2003 are summarized for the reporting year December 29, 2002, through January 3, 2004. Data for 2004 are summarized for the reporting year January 4, 2004, through January 1, 2005.

†For this report, persons identified as white, black, Asian/Pacific Islander, American Indian/Alaska Native, and of other/unknown race are all non-Hispanic. Persons identified as Hispanic might be of any race.

§*Northeast:* Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; *Midwest:* Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin; *South:* Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia; *West:* Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

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