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A Newsletter for the UMDNJ Laboratory Community

In the News

Tularemia & Flu Incidents Dictate Prudent Risk Assessment & Containment of Biohazardous Agents

What if you were using an attenuated organism or replication incompetent vector in your research turned out to be the virulent parent organism? Would you be able to say that your biosafety practices provided adequate protection to your staff, support personnel, and the environment? Have you tested your stocks? Do you conduct periodic review of your labs biosafety practices?

Earlier this year, it was reported that two researchers at Boston University had been exposed to tularemia. Because the researchers assumed that they were working with a form of tularemia not known to cause illness, they did not immediately link their symptoms to their research. It wasn't until after a 3rd researcher became ill that faculty members began to suspect that something could be seriously wrong in the laboratory. Tests showed that a dangerous strain of tularemia had contaminated BU's research supply. Apparently the workers, all of whom recovered, had inhaled a lethal strain.

Tularemia (Francisella tularensis), also known as Pasteurella tularensis, rabbit fever, deerfly fever, Ohara's disease, and Francis disease, is considered a Biosafety Level 3 (BL-3) bacterial agent because only 5-10 organisms are needed to cause infection by inhalation.

The researchers who became ill were working in a low-security Biosafety Level 2 (BL-2) lab, which has fewer stringent safety standards than BL-3. The tularemia researchers believed they were using a safe live vaccine strain of the bacteria, called LVS, which has been used for vaccinations.

How the workers became infected is unclear, although BU officials said researchers had violated procedures intended to protect them from exposure. Reportedly, tularemia research began without approval of the BU Institutional Biosafety Committee, which is responsible for ensuring safe handling of such bacteria. BU has accused the researchers of working with tularemia outside a biological safety cabinet and not wearing goggles.

In August, BU received a vial of Type A tularemia, the dangerous form, from a new supplier. Somehow the harmless LVS bacterium sample was mixed with the virulent strain. Probes into the lab mishap focused on the possibility that a naturally occurring lethal strain contaminated animal blood used to promote bacterial growth.

Even though vaccine research is usually done with an attenuated or less pathogenic organism, researchers must conduct proper risk assessment and use biocontainment when working with the parent organism and associated disease. In addition, it is a matter of good lab practice for the Principal Investigator to suspect possible laboratory exposures when occupational illnesses occur.

This incident illustrates how critical it is to follow safety procedures. This is especially crucial as BU prepares to build a high-security BL-4 laboratory with federal funds to study deadly organisms as part of the nation's antiterrorism campaign.

Pandemic Flu Strain Inadvertently Distributed to 6,000 Labs in 19 Countries

A dangerous strain of the flu virus that caused a worldwide pandemic in 1957 was sent to thousands of laboratories in the United States and around the world. The H2N2 virus was distributed in proficiency testing kits sent by Meridian Bioscience, Inc. as part of a routine quality-control certification test conducted by the College of American Pathologists (CAP). Normally, currently circulating influenza A viruses (H3N2; H1N1) are used for proficiency testing. To date, there have been no reports of H2N2 infections in laboratory workers associated with the CAP samples and the US Health and Human Services has taken steps to ensure the materials rapid destruction.

The H2N2 virus identified in kits was found to be similar to H2N2 viruses that circulated in humans in 1957-58 at the beginning of the so-called Asian influenza pandemic. Because the virus has not circulated in the wild since 1968, anyone born after that would have no natural immunity to it. Since the virus is easily transmitted from person to person and many people are not immune, this incident has raised alarm of another deadly pandemic if a laboratory worker became infected. H2N2 virus is not contained in current trivalent influenza vaccines.

The company that shipped these pandemic flu virus samples to thousands of labs apparently wasn't even aware it had sent such a deadly virus. According to Meridian's process and evaluation they thought it was "an innocuous, typical influenza A virus, the kind of virus they've used before in our programs."

Viruses are classed according to the level of safety precautions that must be taken when handling them. For years, the 1957 flu virus has been a BL-2 virus, but many countries have upgraded it to BL-3 because so many people have no immunity to it. On April 18, 2005, a spokesman for the US Centers for Disease Control and Prevention (CDC) said that the agency was tightening restrictions on the types of labs that can work with flu virus strains that have caused pandemics, including H2N2. These viruses are being upgraded from BL-2 to BL-3.

While some biosafety experts welcome the measures, others argue that such accidents will only be prevented if there is a shift in attitude among those working with dangerous viruses and bacteria. Some flu experts believe it is overkill, while others believe it is long overdue and every H2N2 sample from 1957 needs to be rounded up and locked down.

A CDC spokesman said, "People need to understand that the very labs that receive these strains of influenza all have people trained to work safely and effectively with these viruses."

While a few H2N2 laboratory-acquired infections have been documented in the past, the likelihood of laboratory-acquired influenza infection is considered low when following proper biosafety precautions. Working in a biological safety cabinet and using recommended personal protective equipment, greatly reduces the risk.

The rules that govern some agents have been met with resistance from some scientists. Others question whether there are enough experienced, and competent scientists to run BL-3 and BL-4 facilities in the expanding field of biodefense. Events described in this article may focus additional attention on ensuring vigilant compliance with biosafety rules.

Recent Incidents

Flammable Spill at UMDNJ

A spill occurred in a UMDNJ lab when a shelf in a flammable storage cabinet collapsed. A gallon bottle of glycerol and a gallon bottle of isopropyl alcohol broke and spilled. Additionally, a gallon bottle of acetone had fallen off the shelf and was leaking. It is believed that improperly installed shelving clips caused the collapse. This was a new lab and the solvent cabinet was being used for the first time. An inspection of all the shelves in the area found other clips that were not installed properly.

Instead of vacating the room and phoning Public Safety Dispatch using the emergency number, as required by University policy, the three lab employees cleaned up the spill, which took about 30 minutes. They used a broom, a dustpan, and brush to pick up the broken glass and the liquid. They placed the entire contents of the spill, including the liquid, in a box designed for broken glass. The students left the spill cleanup material in a cardboard box, where it continued to evaporate over the weekend.

Although the employees recently attended training where emergency procedures were reviewed, they did not follow University procedures. These same procedures are listed in the "Emergency Response Guide" posted in each laboratory. Lab personnel are responsible for cleaning up minor chemical spills, only. A minor chemical spill is defined as ≤ 1 liter of any chemical that is NOT a carcinogen, acutely toxic or a reproductive hazard. EOHSS and other emergency response personnel handle all other chemical spills. Everybody should have left the room and someone should have reported the spill by calling Public Safety Dispatch from a safe location. EOHSS will then followup with the caller to gather additional information.

Besides posing a fire hazard (vapors from flammable liquids catch on fire, not the liquids themselves), and violating UMDNJ policies, the researchers violated EPA regulations regarding hazardous waste disposal. It is against federal environmental regulations to evaporate chemical waste into the atmosphere and most chemical waste cannot be disposed down the sink or in the trash.

Spill/Fire at Ohio State University

Another spill caused by the collapse of a shelf in a flammable storage cabinet lead to an explosion and fire at Ohio State University, causing damage ranging from $200,000 to 300,000. Spills due to the unstable shelf had occurred previously but no one repaired or replaced the defective shelf. In this instance, graduate students were unpacking 12 containers of hexane when one of the shelves collapsed. The resulting three-alarm blaze took about 20 fire trucks and 84 firefighters from several area fire stations more than an