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Environmental & Occupational
Health & Safety Services

BENCHSMART

*A Newsletter for the UMDNJ Laboratory Community***In the News****Tufts University Fined \$5,625 for Broken Centrifuge Tube**

Tufts University was fined \$5,625 as a result of a centrifuge accident at their Cummings School of Veterinary Medicine. The Worcester Telegram and Gazette News reported that a test tube cracked while spinning in a sealed centrifuge. The tube contained between 1 and 1.5 mg of botulinum toxin type E. The laboratory's procedures called for a 30 minute waiting period after every spin of botulinum toxin. A worker opened the centrifuge before the required 30 minutes had passed, and discovered the damaged tube. The waiting period would have allowed botulism aerosols created by the centrifuging process to settle out of the air. Instead, the lab worker and four colleagues were exposed to the aerosolized toxin.

The lab workers cleaned up the spill, but did not wear the proper personal protective equipment. OSHA's report on the incident indicates that the workers wore dust masks and N95 respirators at different times during the cleanup. OSHA recommends that for spills of botulinum toxin, workers should wear at least a full face respirator with N100 cartridges.

Additionally, the lab workers were not annually fit tested.

OSHA also cited Tufts because the workers involved in this incident were not trained on emergency response procedures. Protocols had been developed to address what to do in the event of a spill in the centrifuge, but the lab workers did not follow the protocol. Luckily, the five employees did not experience any symptoms as a result of their possible exposure to the botulinum toxin.

This incident should remind all UMDNJ researchers to carefully follow their procedures, especially when dealing with hazardous materials. Be sure that your lab is equipped with the supplies needed to safely handle dangerous materials both on a day-to-day basis *and* in an emergency.

References

Emerging Infections Network. April 21, 2006. *USA (Massachusetts): Botulinum toxin exposure in laboratory.* <http://depts.washington.edu/einet/?a=printArticle&print=1819> on August 16, 2006.

U.S. Department of Labor, Occupational Safety and Health Administration. July 10, 2006. *Citation and Notification of Penalty.* http://www.tufts.edu/vet/vet_common=/pdf/news/osha_report.pdf

Worcester Telegram and Gazette News. July 20, 2006. *OSHA fines Tufts \$5625 for release of toxin in April.*

<http://www.telegram.com/apps/pbcs.dll/article?AID=/20060720/NEWS/607200762/1008/NEWS02> on August 18, 2006.

Update**Mold in Cold Rooms**

Recently Michigan State University spent \$50,000 to clean several cold rooms that were severely contaminated with mold due to a power outage, dust from renovation projects and the presence of cardboard and other organic materials in the rooms.

Mold in cold rooms has also been a problem (to a lesser degree) in some UMDNJ facilities. Warm, moist environments support mold growth. However, mold can also grow in colder temperatures with high humidity such as when cold rooms are shut down for repairs, or if the door is frequently left opened. Mold growth is most likely to be initiated on cardboard, paper and other organic materials.

The most obvious types of mold include the black/grayish growth that occurs on paper products, floors, walls etc. A white, powdery material found on cold room surfaces is often assumed to be oxidative degradation.

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However, it may be mold, which like all mold can cause ill health effects. (See http://www.orcbs.msu.edu/biological/resources_links/Cooler_Mold.pdf for pictures)

Due to the health and financial concerns associated with mold contamination, the following safety precautions must be taken:

- * Keep unnecessary cardboard and other paper materials out of cold rooms.
- * Items that are collecting mold should be cleaned or discarded. Even small amounts of mold must be cleaned up. Contact EOHSS for assistance on appropriate clean-up measures if mold is found.
- * For long term cold room shut downs (greater than one day), thoroughly clean the walls and surfaces with dish detergent and keep the doors open to allow for complete drying of the unit. Do not close the doors until the unit is ready to be re-entered into service
- * Cold rooms must be cleaned biannually or more often if mold is more persistent. If a cold room is shared among several groups, the cleaning and maintenance responsibilities can be shared. The process of cleaning includes the following:
 - 1) Using a slightly diluted general dish detergent, wipe all surfaces. Bleach solutions should be avoided as cold rooms are not ventilated.
 - 2) Wipe up any excess water to prevent additional moisture from being added to the cold room. Splash goggles, lab coat and disposable gloves must be worn when cleaning the cold room. If there is a lot of mold present, a respirator may be needed. Be sure to contact EOHSS for advice should this situation arise.

In summary, UMDNJ researchers can inhibit mold growth in their cold rooms by minimizing the amount of cardboard and paper inside, and by quickly cleaning any mold that develops.

These simple steps will prevent costly and time consuming decontamination and will also avoid resulting health effects.

Recent Incidents

Laboratory Exposure Incidents Highlight Biosafety Failures

Vaccinia is the cowpox virus which was used to vaccinate against smallpox. In the USA, routine vaccination against smallpox ended in 1972. Highly attenuated and non-attenuated vaccinia is used in molecular biology, immunology and cancer vaccine trials today because vaccinia vectors allow insertion of 2kb genomic inserts, do not integrate into host cells, have high levels of gene insert expression, and are effective in presenting the genetic insert as an antigen in human cells.

Recognizing the risks when working with either attenuated or non-attenuated strains poses a serious challenge for laboratory personnel. Some of the risk factors are 1) the ability of the virus to replicate, 2) its ability to cause a productive infection, and 3) the nature of the genetic insert. Some highly attenuated strains replicate poorly in human cells (NYVAC, MVA, ALVAC and TROVAC) and vaccination is not recommended when working with them. Work with non-attenuated strains of vaccinia (Western Reserve (WR), NYCBOH) pose added risks. Vaccination provides protection and is therefore highly recommended. There are many cases of lab exposure to vaccinia in the literature; cuts with coverslips, needlesticks, splashes and exposure to abraded skin. The two cases presented below illustrate why prudent biosafety practices are mandatory when working with this viral agent.

Case #1: An immunology graduate student was working with a recombinant WR strain of vaccinia as part of her thesis research. One morning she noticed the onset of itching, tearing, swelling of the eyelids, and conjunctival injection in her left eye. A diagnosis was made of viral

conjunctivitis and over-the-counter eye drops were prescribed by her student health services. Her symptoms continued to worsen over the next 5 days. The eye became swollen, red, and painful; she felt sick, fatigued and feverish. She went to a specialty eye hospital where the diagnosis of vaccinia infection was not suspected until the student first mentioned her work with vaccinia. Polymerase chain reaction (PCR) testing showed evidence of vaccinia; results were confirmed at the Centers for Disease Control and Prevention (CDC). Vaccinia immune globulin (BIG), 6,000 U/kg IV, was administered. Less than 24 hours after BIG administration, the patient's pain and swelling were substantially decreased. She improved and was released from the hospital after 9 days, however recovery took several weeks.

An inspection of the laboratory and a review of lab practices showed several exposure opportunities.

- * Staff wore eye protection only infrequently while using vaccinia.
- * Lab-coat sleeves were not elasticized and did not always cover the wrist.
- * Waste pipettes were not disinfected before removal from the biosafety cabinet.
- * Samples with live virus were manipulated outside the biosafety cabinet.
- * Lab staff routinely vortexed tubes containing live virus outside of the biosafety cabinet.
- * Lab workers had not been vaccinated within the past 10 years, as recommended by CDC when working with this strain of vaccinia (recombinant Western Reserve vaccinia).

The review determined that the source of infection was from a single experiment where a 96-well plate containing small amounts of live vaccinia-infected mammalian cells were removed from the biosafety cabinet and hand-carried to another room.

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There, the lid of the plate was removed, and the cells were examined for fluorescence. The student did not wear eye protection, nor was it clear if she was wearing gloves.

Case #2: A 26-year-old healthy laboratory worker, previously vaccinated against smallpox in childhood, sought treatment for pain followed by the appearance of erythema and a pustule on the left thumb. Symptoms appeared three days after she experienced an accidental needlestick while working with material from a vaccinia virus (strain WR)-infected cell culture during a virus purification procedure. The hand lesions were treated and surgically excised to remove the necrotic tissue, and pustular fluid was collected for analysis. Full recovery was seen after four weeks.

A sample of the pustular fluid was indistinguishable from that of the WR strain of vaccinia virus currently used in the laboratory.

Although the patient had been vaccinated against smallpox >20 years ago, a serum sample isolated six years before the accident showed a level of vaccinia virus-specific IgG antibodies approximately two times higher than the level in naive persons. In this case the level of humoral immunity was not able to prevent the progression of the infection as would be expected if she had been vaccinated recently. This result indicates that despite the high IgG levels induced after vaccinia virus inoculation, persons vaccinated for >20 years are no longer fully protected against vaccinia virus infection and could be vulnerable to variola virus or other orthopoxviruses that infect humans.

When working with non-attenuated vaccinia strains "strict" biosafety practices need to be considered:

- 1) performing all manipulations of virus in the biosafety cabinet or other enclosed equipment
- 2) frequent glove changing accompanied by hand washing
- 3) always wear goggles or face shields when working with virus outside of a primary containment device (use of eye protection should be particularly stressed, as serious eye infections can occur even in previously vaccinated persons)
- 4) vaccination as recommended
- 5) use of secondary containment for transporting materials
- 6) elimination of needles and sharps in procedures

There are complications, precautions, risks and contraindications to the vaccine and vaccination against vaccinia virus for personnel who work with it is voluntary. Instances when vaccination is warranted include situations where high titers or large volumes of non-attenuated virus are being worked with. An employee should receive counseling from the Director of Employee Health and/or his/her own personal physician to assist in making a decision.

References:

Centers for Disease Control and Prevention. Vaccinia vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2001. *MMWR Recomm Rep* 2001 Jun 22;50(RR-10):1-25, CE1-7.

Accidental Infection of Laboratory Worker with Vaccinia Virus, *Emerging Infectious Diseases*, Vol. 9, No. 6, June 2003

Ocular Vaccinia Infection in Laboratory Worker, Philadelphia, 2004, *Emerging Infectious Diseases*, www.cdc.gov/eid, Vol. 12, No. 1, January 2006

Biosafety Issues in Laboratory Experiments Using Vaccinia Viral Vectors, *Applied Biosafety*, Journal of the American Biological Safety Association, Vol. 10, No. 2, 200

Closer To Home

New at EOHS

New Online Training Modules: New online modules are available for laboratory safety training and bloodborne pathogens/biosafety training University-wide. New clinical safety training modules are available for the central and south campuses. A training certificate is automatically generated upon completion of the modules.

New EOHS website coming soon!

The EOHS website has been redesigned to be more user-friendly and visually appealing. It also contains information on University safety committees as well as health and safety approval procedures. Cross referencing has been expanded to make it easier for the University community to find forms and documents. EOHS forms are being reformatted for on-line completion.

New Publications: The following new publications may be accessed at:
<<http://www2.umdnj.edu/eohssweb/publications/factsheets.htm>>:

UMDNJ Biosafety Guidelines for Sorting of Unfixed Cells

Factsheet: Laboratory Ergonomics (available in English and Chinese)

Factsheet: Laboratory Animal Allergens

Detailed Standard Operating Procedures (SOPs) are now available for the following materials: Hydrofluoric Acid MPTP, Osmium Tetroxide, Shigella Toxin, Tetanus Toxin, Sodium Azide, Cyanogen Bromide

UMDNJ Employee Health and Safety Handbook: These handbooks provide detailed campus-specific information on health and safety resources, procedures and phone numbers. If you would like a paper copy contact your campus EOHS office.

Regulatory Spotlight

Mercury and Silver Source Reduction at UMDNJ

In 2004, UMDNJ signed a seven year Consent Agreement/Final Order (CAFO) with the United States Environmental Protection Agency (USEPA). This CAFO took the form of a Supplemental Environmental Project (SEP) consisting of four components. One of the four parts of this SEP focused on Mercury and Silver Source Reduction. This article summarizes EOHSS' progress implementing Mercury and Silver Source Reduction. In the next several editions of BenchSmart we will chronicle our work in other areas of Environmental Compliance, including:

- Chemical inventory and removal/retention;
- The RCRA (hazardous waste) audit program,
- Underground Storage Tank (UST) Management,
- Air and Water Quality,
- Stormwater management
- Environmental Management System (EMS)

Mercury Source Reduction -EOHSS is in the process of implementing a program to reduce the use of mercury throughout the University and thus prevent the need to dispose of mercury containing waste. EOHSS identified all mercury waste streams and has identified non mercury substitutes where available. To date, 90% of all mercury containing equipment has been removed from the Newark campus. All mercury sphygmomanometers have been removed from the CAB in New Brunswick and the former Hillsborough University Medical Group. Plans are in place to replace mercury containing sphygmomanometers on the Stratford campus by October 1, 2006.

Mercury thermometers and other mercury containing devices must be replaced wherever possible. An exception may be made, however, if a particular piece of equipment is necessary for a specific procedure or experiment; however, the equipment will remain in the current inventory and a waiver signed by the department needing the mercury containing equipment. When the particular piece of equipment is no longer needed, EOHSS will work with the department to remove it and replace it with non mercury equipment.

Silver Source Reduction - EOHSS has identified and inventoried all silver bearing products and waste streams throughout the University and has identified substitutes. On the Newark campus there are thirty-nine photo processing units. Eleven of these were converted to digital; fourteen employ silver recovery; twelve generate silver waste that is disposed of as hazardous waste; and two are closed. This fall, EOHSS will initiate a centralized procedure to recover Silver from the twelve remaining photo processing units in Newark that are disposing of used fixer as hazardous waste.

In the south and central campuses and NJDS, all units are using silver recovery. A fact sheet on radiographic waste is posted on the EOHSS website at: <http://www2.umdnj.edu/eohssweb/publications/silverwaste.htm>. For more information contact Kyle Sangiovanni at x2-3411.



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HEALTH & SAFETY SERVICES

The Department of Environmental and Occupational Health and Safety Services (EOHSS) provides support to the University community through the development and implementation of health and safety programs. Some of the key areas in which EOHSS provides assistance are: hazard evaluation and control, consultation and technical assistance, safety education and training, hospital safety, fire/life safety, emergency chemical spill response, chemical waste management, and laboratory safety.

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BenchSmart is published quarterly by the Department of EOHSS for UMDNJ laboratory personnel. This newsletter will address current and relevant laboratory health and safety information for the research community. If you have any comments, would like to submit an article, or would like us to address a particular topic, please contact Lindsey Kayman, CIH, at (732) 235-4058 or at kayman@umdnj.edu or contact Kyle SanGiovanni at (973) 972-3211 or at sangiova@umdnj.edu.