BioSide Lines

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The Newsletter of the Office of Biological Safety, UW-Madison Safety Department
www.fpm.wisc.edu/biosafety

The Centrifuge: A common source of laboratory contamination

The photo shows the result of a catastrophic centrifuge failure. The rotor failed and its contents, including heavy metal chunks, were distributed about the lab causing major damage. There likely would have been injuries to personnel if this incident hadn't occurred at night. Thankfully, dramatic centrifuge failures of this sort are rare. Much more common, however, and less visibly evident, are failures of a centrifuge to adequately contain the contents.

Data from European laboratory inspections* where laws require sampling of surfaces are compelling. Sampling for adenovirus strain 5 in eight Swiss laboratories showed significant contamination of the microscope in two labs, the incubator handle in four labs, and the centrifuge in five labs (Figure 1). The results from German laboratory inspections show centrifuges to be primary culprits of contamination (Figure 2); the tabletop centrifuge was worse than the ultracen-trifuge. Adenoviral DNA was detected in swab samples 3 meters distant from a tabletop centrifuge.

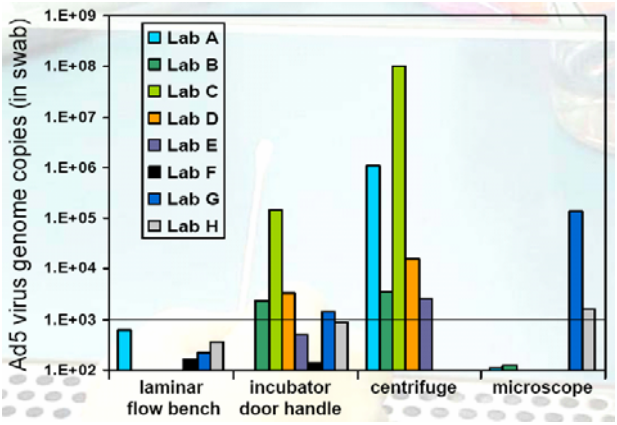

Fig. 1. Results from routine inspections and sampling.

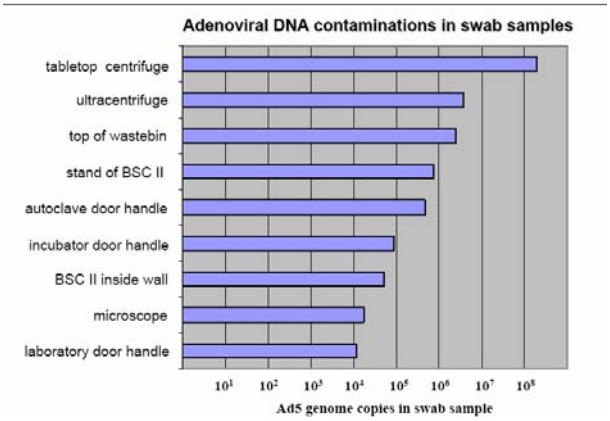

Fig 2. Results from routine inspections and sampling

Centrifuge manufacturers provide information regarding equipment care. Their instructions must be followed meticulously to prevent failure of the centrifuge. Further safeguards for use of the centrifuge with hazardous materials are critical for reducing laboratory contamination. Aerosols can be avoided by using appropriate safety equipment and observing the following good practices.

- Sealed centrifuge tubes and sealed safety buckets should be used to avoid the formation of aerosols and the deposition of centrifugation material on the centrifuge wall and outside of primary containment.

- Use sturdy tubes. Check them for wear indicated by scratches, cracks, chips, etching, or stress marks. Avoid use of celluloid tubes since they are highly flammable and prone to shrinkage with age.
- Use tubes with a gasketed cap, particularly when secondary containment is not possible. Some tubes with screw top lids, such as Falcon tubes, do not seal tightly and may deform and leak under centrifugal forces.
- Fill centrifuge containers (tubes, bottles, etc.) in a BSC. Wipe the exterior with disinfectant before placing in safety cups or rotors.
- Never overfill containers. The rim of the cap should not become wet with culture; if the rim is soiled and the cap seals imperfectly, some fluid may escape. The maximum fill for tubes is ¾ full.
- Load and open centrifuge rotors in a biosafety cabinet (BSC).
- Use rotors covered with a lid. A sealed lid will improve containment, but the crucial containment should be provided by the primary containers.
- Make sure containers are properly balanced.
- If hazardous material was centrifuged, wait 10 minutes before opening the centrifuge lid to check for leaks. A clear lid will help you see if there was a problem during the run.
- Small low-speed centrifuges may be placed in a BSC during use to reduce the aerosol escape.
- Rotors and cups should be cleaned and disinfected after each use with non-corrosive cleaning solutions. Never use bleach to disinfect a rotor since it is corrosive and weakens the aluminum alloy which can then disintegrate. Test tube brushes must not be used for cleaning the cup cavities.

Err on the conservative side and assume that contamination from the centrifuge “happens”. Always use personal protective equipment (gloves, lab coat and safety glasses at a minimum) and routinely disinfect laboratory surfaces. Personnel must be given training in proper procedures for use and care of the centrifuge.

* Data reproduced with permission of Guido Vogel, Biological and Chemical Safety Administration, Basel, Switzerland. Presented at American Biological Safety Association meeting, October 2003.

Biological Safety Cabinet (BSC) Training

http://www.fpm.wisc.edu/biosafety/Training/BSC/BSC-Training-1.htm

Computer-based training (**WebCT**) is available for UW-Madison faculty, staff and students. The training is divided into five units:

Unit 1 - Describes different primary ventilation equipment (fume hood, clean air device, BSC) and the types of protection each provide.
Unit 2 - How do BSCs work: airflow patterns, protection, HEPA filters and exhaust connections.
Unit 3 - Types of BSCs: Class I, Class II (Type A1, A2, B1, B2), and Class III. These unique classes of cabinets offer different types and levels of protection.
Unit 4 - Describes how to use a BSC effectively: locating it in your lab, preparing to work, working in BSC and cleaning the BSC.
Unit 5 - Describes the testing a BSC must undergo to ensure that it is providing personnel, product, and environmental protection.

Individuals can follow the above link and with their NetID (WiscWorld username) and password to take the training at their convenience. If you don't know your NetID and/or NetID password, you may need to activate your NetID (my.wisc.edu) or call the DoIT Help Desk, 264-4357 if you have forgotten NetID or password.

Print out and use the instructions to go through the training. For your first visit to our training, use the "BSC Training (1st Log-in)" link https:/uwmad.courses.wisc.edu/webct/public/guest.pl?fpm_0203 and complete the Additional Information page, then continue.

If you cannot complete the training at one sitting, feel free to return at any time using the "BSC Training (Standard Log-in)" link https://uwmad.courses.wisc.edu/.

Quizzes are included to test your understanding and must be completed before you pass to the next unit. To document your training, print out and retain the results of the submitted quizzes.

If you have any questions, please call Darren Berger (263-2187) or email us at biosafety@fpm.wis.edu.

Shipping Diagnostic Specimens - Update

The marking requirement has been simplified. The “DIAGNOSTIC SPECIMENS PACKED IN COMPLIANCE WITH IATA PACKING INSTRUCTION 650” is no longer required. It has been replaced by the simple text, “DIAGNOSTIC SPECIMENS”. Also, there now is a package size requirement of not less than 100 mm x 100 mm on one side. Call OBS to request an up-to-date version of PI650.

Shipping Infectious Substance and Other Biological Materials

The Office of Biological Safety will provide training and certification for shipping Infectious Substance and other biological materials, with a focus on safety and regulatory compliance for research laboratories. The Department of Transportation requires that persons involved in shipping hazardous materials in commerce be trained and certified in proper handling of these materials.

Wednesday, January 21, 2004
Union South 1:00 – 3:00 p.m.
Refreshments will be served.

Registration is required. Contact OBS at 263-2037 or biosafety@fpm.wis.edu.

All staff are welcome to attend this class for initial or re-certification. Staff approaching their two-year expiration for certification will receive a notice in advance of that date. Computer-based training is available only for those who attended the class for their initial certification.

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