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# BioSide Lines

FOSTERING SAFE WORK & LABORATORY PRACTICES THROUGH TRAINING & EDUCATION

## Annual Lab Safety Program Review

**Choosing a consistent time every year for annual review and update of your laboratory safety plans is an important component of safety and compliance and can help foster an active, sustainable culture of safety in the lab.** Therefore, it is good practice to set aside a specific time each year to review and update your lab's safety programs. Many labs choose to complete their annual review in the summer when coursework loads are lighter, which allows the entire lab-group to get involved. Some labs review their lab safety plans during the fall when students have returned, while others take advantage of winter or spring break. No matter what time of year you choose, make it a consistent, annual part of your lab program.

Some suggestions for conducting your own lab safety program review include meeting as a group to discuss any safety related issues that transpired during the past year. How were they addressed? What was learned? Be sure to include a discussion of training, hazardous waste handling and disposal, personal protective equipment, engineering controls, and all related safety processes and procedures. In addition, set aside time to review and update your Biosafety Protocols for changes to personnel, space and equipment (see Q&A on back page for information about updating your protocol). Go through your Chemical Hygiene plan and update as needed, also considering your chemical inventory and MSDSs. This can also be an opportune time

to discard unneeded chemicals (contact the Chemical Safety Office for assistance). Review your emergency action planning, emergency contact list and update your yellow door cards (available through the Environment, Health & Safety Department - EH&S). Finally, determine any training needs for additional learning opportunities as well as any refresher or annual trainings such as Blood-borne Pathogens, Radiation Safety, Chemical Safety, and Biosafety (contact your Biosafety Trainers for more information).



## BIO-NEWS

### BIOLOGICAL SAFETY STAFF UPDATE

The Office of Biological Safety (OBS) welcomes the addition of Karen Demick to our staff. Karen will fill the position vacated by Marisa Trapp, who recently moved into an environmental compliance position within EH&S. Karen brings 17 years of research experience, having worked as a lab manager in Bacteriology and MMI, and a researcher in Genetics. Karen's expertise will nicely complement OBS support services to our first-rate biological research community.

# Biosafety Practices:

## Viral Vector Safety

Viral vectors are often designed to enter mammalian cells and deliver genes of interest and are usually replication-deficient. These vectors include retrovirus/lentivirus, adenovirus, adeno-associated virus, poxvirus, herpes virus, alphavirus and baculovirus. Generally these vectors have the genes necessary for replication removed and supplied separately (e.g., plasmids, helper viruses or packaging cell lines). It is important to remember that accidental infection can result in delivery of the foreign gene.

There are several biosafety concerns that arise with the use of viral vectors including:

- Tropism (host range) – viral vectors that can enter (infect) human cells are often used.

- Replication-deficient viral vectors can re-gain the deleted genes required for replication (become replication-competent) through recombination - referred to as replication-competent virus (RCV) breakthroughs.

- Genes may be expressed in tissues and/or organisms via transient or integration into the genome where they are normally not expressed. In the case of genes such as oncogenes this could have

negative consequences.

To improve safety when working with viral vectors consider the following:

- Consider the alternative of nonviral vectors. Advances in nonviral vector technology may mean that a nonviral vector will serve your purpose.

- Limit tropism – narrow the host range and/or tissue infected. If you require your viral vector to infect human cells, consider engineering the vector so that it only infects specific tissue(s).

rather than as continuous culture (use of a packaging cell line with replication genes integrated into the genome of the cell line).

- For viruses with complex genomes like adenovirus, delete as much of the viral coding sequence in the vector as possible (e.g., “gutless” adenoviral vectors).

- Use ecotropic MMLV with methods that allow the virus to enter human cells in a limited manner.

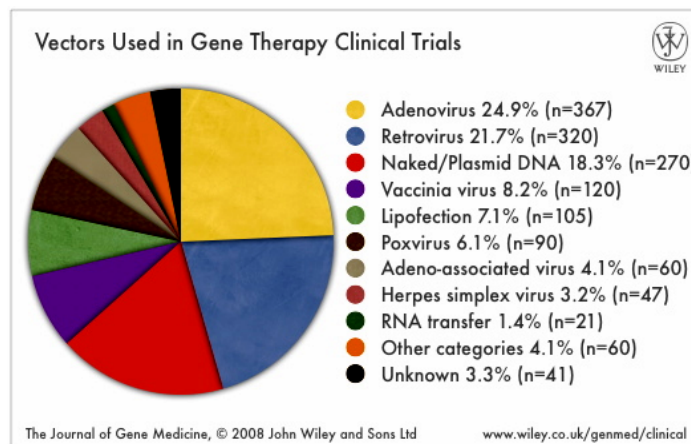
- Use controlled recombination (site-specific recombination mechanisms) to activate/inactivate viral replication genes.

When using viral vectors, ways to optimize safety must be considered. A comprehensive risk assessment that evaluates the risks of viral vector projects and the mitigating aspects of

the experimental design is essential.

Ultimately, training staff to safely handle viral vectors (and animals infected with viral vectors) is the responsibility of the Principal Investigator. OBS is available, however, to provide assistance and consultation.

Please contact OBS at 263-2037 or [biosafety@fpm.wisc.edu](mailto:biosafety@fpm.wisc.edu) with any biosafety questions including those regarding safe handling of viral vectors or visit our website for more information ([www.biosafety.wisc.edu](http://www.biosafety.wisc.edu)).



- Use strategies to decrease chances of RCV breakthroughs.

- ♦ Split genomes of viral replication genes so that more recombination events would need to occur in order for an RCV breakthrough.

- ♦ Remove viral regulatory regions to decrease the chance of homologous recombination occurring.

- ♦ Produce virus as a transient single batch (simultaneous transfection of plasmids)

# LABORATORY SAFETY:

## Research Safety During Pregnancy

Lab personnel working in environments with physical, chemical or biological risks need to be aware of the impact of those hazards to their health. Once aware of the hazard's potential health impacts, employees and students can take prudent precautions to reduce these risks.

During pregnancy, it is especially important to consider work-related health risks. Many common laboratory activities, materials and reagents can harm pregnant woman, the embryo and fetus. Many risks are commonly understood, such as radiation, lead, mercury and some pathogenic agents. Other biologic agents such as those that cause herpes, tuberculosis and syphilis can be transferred through the placenta and damage the fetus if a mother has an exposure event. Low birth weight is a concern if there is an exposure to rubella, cytomegalovirus or chicken pox. Q fever (Coxiella) and toxoplasmosis infections can result in miscarriage or stillbirth. Much of the organ development occurs in the first trimester of pregnancy, and it is possible for exposures to occur before realization of the pregnancy. If you are planning a pregnancy consider additional precautions in advance.

It is important to remember that pathogenicity of an agent is often based on the reaction of an "otherwise healthy adult." Although a woman may experience a healthy pregnancy,

the pregnancy itself decreases the ability of a woman's immune system to fight infection. In most situations the use of appropriate personal protective equipment (PPE) will prevent exposure to pathogens or other harmful laboratory agents. If appropriate PPE is not an option or you seek greater security from dangerous exposures, avoid working with particular agents, such as those listed before as well as hazardous materials that can cause birth defects (e.g., ethidium bromide) or which are highly toxic when absorbed through skin (e.g., thimerosal).

In addition, do not ignore the physical hazards always present in your laboratory. Heavy lifting, climbing, repetitive motions or wet floor areas may be of particular concern to a pregnant women. Proper ergonomics can be beneficial to ensure comfort while you conduct work in your laboratory.

If you have questions or concerns about research safety during pregnancy, speak with a physician, your supervisor or contact the UW Occupational Health Program at 265-5000.



## OBS UPDATE:

### Category A Hazardous Materials Shipping

Recently, a UW-Madison laboratory successfully underwent a surprise infectious materials shipping document inspection conducted by the Federal Aviation Administration (FAA). The laboratory's records for infectious substance shipments and shipper training were top-notch (congratulations!). Be aware that if your laboratory ships ANY hazardous materials (particularly Category A Infectious Sub

stances), you too could be subject to a visit from the FAA or DOT (U.S. Dept of Transportation). A list of many of the Category A substances has been posted on the OBS website.

The UW-Madison Environment, Health & Safety Department is available to help with additional hazardous material shipping questions or concerns. HazMat shipping training is available through the OBS, Chemical Safety Office and Radiation Safety Program, in addition to private training programs. Contact [bio-safety@fpm.wisc.edu](mailto:bio-safety@fpm.wisc.edu); tell us what you ship, and we will help you find the right training.



# Biosafety Q&A

## Protocol Changes

### *How do I amend my biosafety protocol?*

The process for amending an existing biosafety protocol depends on the type of change(s) being made. Submission methods for amendments are similar to submission methods for a new or renewal protocol:

**Grant additions.** Grants and proposals that utilize the materials, locations and methods of the existing protocol may be added using one of two methods: The first is to enter the required information (title, funding agency and, if known, grant number) into Section I (Core Registration Information) of the protocol form, then email this section to the UW-Madison OBS at [biosafety@fpm.wisc.edu](mailto:biosafety@fpm.wisc.edu). The second is to simply include the same information in the text of an email sent to OBS. Be sure to include PI name and protocol (SC) number in the email.

**Personnel changes.** Similarly, adding or removing laboratory personnel from a protocol can be accomplished by either modifying the protocol form (as mentioned above) and emailing it to OBS or including the information in the text of an email sent to OBS. Be sure to include PI name and protocol (SC) number in the email.

**Major amendments.** These generally involve more significant changes to the biosafety protocol, such as changes in research elements, microbes utilized and location changes. Such changes should be noted in the biosafety protocol using bold, underlined or highlighted text, then the amendment should be emailed to OBS for review and approval.

**Protocol processing and submission deadlines.** Many protocol amendments may not require review by the UW-Madison Institutional Biosafety Committee (IBC) and will be reviewed internally by OBS risk management staff. These amendments can be submitted at any time during the month. However, some protocol amendments will require review at the monthly IBC meeting, which is typically held the first Wednesday of each month. Protocol amendments requiring IBC review generally involve more complicated recombinant research, activities conducted at BSL-3 and activities involving Select Agents. Protocols reviewed by the IBC must be on the most current protocol form and must be submitted to OBS one month prior to an IBC meeting in order to allow sufficient time for review. However, with Biosafety Officer approval, we will try to accommodate requests for expedited processing under special circumstances. OBS staff will notify researchers if their protocol amendment will require IBC review.

When protocol amendment information is emailed to OBS, the email should either be sent by the PI of record on the protocol or the PI should be cc'd on the email. Also, the IBC now requires the PI's signature on all major protocol amendments as well as new or renewal protocols. You can use a graphic signature or scan the signed first page to a PDF file and send it with your email submission of the protocol.

Additional protocol revision information can be found on the UW-Madison OBS website under the Protocol tab.



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