UC Davis Policies and Standard Operating Procedures for Work with Biohazardous Agents

Note: all personnel listed on a BUA (including Principal Investigators) need to review the material on this page and abide by all of its provisions.

1. Training. Only those persons who are adequately trained may work with biohazardous materials (human, animal, plant, environment) at UC Davis or its satellite laboratories. This standard includes all students, staff, and faculty involved with the project including the principal investigator, and includes visiting scholars and volunteers. In addition, very short-term visitors to the laboratory (<1 day) who might be inadvertently exposed to biohazardous materials must receive PI-supplied information regarding the nature of the hazards, measures required for avoiding exposure, procedure for post-exposure treatment and follow-up, and the PI's contact information. Basic biosafety, bloodborne pathogen control, medical waste management, as well as "NIH Guidelines Training" (for Research Involving Recombinant DNA) are available from UC Davis Environmental Health and Safety ([enroll online](http://safetyservices.ucdavis.edu)). Training in these topics must be renewed annually. The EH&S class "Safe Use of Biological Safety Cabinets" is required for all users of these devices ([enroll online](http://safetyservices.ucdavis.edu)). More specialized training such as safe work practices in the Biosafety Level 3 laboratory and the Select Agent system may be available from the Campus Biosafety Office. The principal investigator is responsible for all lab- and project-specific training, including experimental methods and techniques, specific hazards associated with the project components, methods employed to reduce the risks to an acceptable level, available project-specific medical surveillance and treatment, and training to use lab equipment. The training record ([3](http://safetyservices.ucdavis.edu)) should include a list of topics covered and materials used (such as the approved BUA), and the trainer and trainee should both sign the training record sheet. All training, including short-term visitor orientation, must be documented. A written quiz or some other method of evaluating trainee comprehension should also be included in the training and training documentation.

2. Shipping and Receiving. All shipments (domestic and international) of biological materials must follow university policy and all applicable federal and international regulations and permitting requirements. Biohazardous materials may not be personally transported to or from campus unless specifically authorized by the IBC in your approved BUA and packaged to comply with current DOT, IATA, and public health agency guidelines, standards and regulations. Biohazardous materials may not be transported in private vehicles unless authorized by the IBC. Export of etiologic agents or recombinant DNA constructs may require federal agency permits (USDA, US Department of Commerce).

3. Local Transport of Infectious Materials. Intracampus transport of infectious materials must be specifically authorized by the IBC as part of your approved BUA protocol. Biohazardous materials transported between laboratories or to other on-campus facilities must be packaged in absorbent
material (enough to absorb the entire liquid volume of the biohazardous material) in a primary leak-proof container with a sealed lid or top, which is enclosed in a secondary leak-proof, non-breakable container (e.g., a Coleman cooler) appropriately labeled with the biohazard symbol (for human biohazards). Any biohazardous or potentially biohazardous materials transported between campus and UC Davis satellite facilities will be escorted by a responsible staff or faculty member. Packaging and labeling must comply with the IATA dangerous goods guidelines or DOT hazardous materials regulations, and shippers must have documented current required training. Transport of Select Agents must comply with special provisions indicated in approved biosafety and security plans as well as current CDC, USDA-APHIS, and DOT rules.

4. Personal Protective Equipment (PPE). Wear appropriate PPE such as gloves, safety glasses and a laboratory coat whenever you work with biohazardous materials. Specific PPE requirements are determined by the risk assessment for the research.

5. Footwear. No open-toed or open-heeled shoes or sandals are allowed in the laboratory. A good practice is to keep a set of lab-dedicated closed-toed, closed-heeled shoes at the laboratory work site. Change into them when you arrive at the lab, and change back to street shoes when you are ready to leave the building.

6. Hand washing. After working with biohazardous materials remove your gloves immediately and wash your hands with soap and water. If soap and water are not available (such as in field work locations), use disinfectant hand wipes.

7. Use of sharps. Minimize the use of sharps with biohazardous materials. Never recap, bend or shear needles—use only hard-walled sharps containers and do not overfill. Wherever possible, replace glassware with plasticware. Keep sharps containers readily available in all locations where sharps waste may be generated. Any programmatic use of sharps in a biological safety cabinet should be documented by a risk assessment that shows that no other alternative is acceptable and that details additional training to safeguard the users. Please refer to EH&S SafetyNet #3 [4].

8. Plastic sharps. The Biological Safety Office recommends strongly that plastic pipettes and pipette tips contaminated with agents biohazardous to humans be disposed in a hard walled red sharps container. Other contaminated pipette tips may be disposed into secondary containers which can then be sealed and disposed into clear autoclave bags (for tips contaminated with other infectious agents or "biotechnology waste"). Medical waste bags used for pipette tip disposal must conform to current regulatory agency bag color and strength standards. Medical waste must be disposed in the approved medical waste stream, and biotechnology waste (with no Medical Waste component as defined in the California Health and Safety Code) must be autoclaved before being disposed in the landfill.

9. Food and Beverage. Eating, drinking, storing food and drink for human consumption, smoking, applying cosmetics or lip balm and handling contact lenses in the laboratory are prohibited in all UC Davis laboratories.

10. Aerosol Generation. Procedures that could generate biohazardous aerosols must be performed in a certified biological safety cabinet. Experimental systems at BSL1 containment (no demonstrable biohazard to humans, plants, or animals) are exempted from this requirement unless specified in permit conditions for the organism.

11. Safe use of biological safety cabinets. Specific training in the safe use of biological safety cabinets is required for all users of these protective devices (available as an online training module — enroll online [2]). Biological safety cabinets should be sited as far from doorways and common use walkways as possible. All biological safety cabinets must be certified under the NSF49 standard before first use, annually thereafter, and after the cabinet has been relocated or repaired. Biological safety cabinets used
for containment of Risk Group 2 microbiological agents in pure culture or for any Risk Group 3 agent use must be gas-decontaminated before being relocated or decommissioned. Only one person at a time may use a biological safety cabinet. Open flames are prohibited in biological safety cabinets. UV light may only be used in a biological safety cabinet if the user removes and cleans the UV tube weekly with 70% ethanol and replaces the UV tube annually. All such maintenance must be documented. Never work in a biological safety cabinet when the UV light is energized, and never operate the UV light with the sash open. Best practice: use the UV light only when the biological safety cabinet is completely empty (so that nothing casts a UV light shadow) and the laboratory is unoccupied. Best practice of all: do not use the UV light because it is a mediocre to ineffective method of decontaminating biological safety cabinets and presents significant hazards to the laboratory occupants.

12. Proper Labeling. Place a universal biohazard label adjacent to the doorway of a lab where biohazardous materials that are infectious to humans are used. Also label work areas, containment cabinets, and equipment including freezers, refrigerators, incubators, centrifuges, shakers, etc. with the biohazard label. Permitting agencies may also require door and equipment labeling for microbial agents not normally biohazardous to humans. Transgenic plants must be labeled in a way to distinguish them from wildtype (unaltered) plants which may be collocated in greenhouses or growth chambers.

Decontamination Procedures. Use a spray bottle of 10% solution of household bleach in water (made fresh daily) to decontaminate equipment and work surfaces. Where bleach could cause corrosion (stainless steel surfaces), use an iodophor such as Wescodyne, or wipe away the sprayed bleach and spray 70% ethanol on the surface. Decontaminate liquids by adding bleach (so that the final solution concentration is 10% bleach), with a 30 minute contact time before drain disposal. Quaternary ammonium disinfectant (e.g. Physan or Greenshield) may be used to disinfect greenhouse benches and materials exposed to plant pathogens. Follow manufacturer label instructions to disinfect solid non-porous surfaces and materials.

13. Spills. Please refer to EH&S SafetyNet #127 [5]. Any spill involving infectious agents or recombinant DNA must be reported immediately to the Biological Safety Officer [6].

   1. Risk Group 2 or 3 agent spill outside of a biological safety cabinet: Let the spill "settle" for at least 30 minutes—evacuate the laboratory and post signs on the doors to prevent re-entry before it is safe. Wear lab coat or Tyvek gown, gloves, goggles, and at least a surgical mask to clean biohazardous spills outside of a biological safety cabinet. Wear a properly fit-tested respirator (at least N95) to clean Risk Group 3 agent spills and Risk Group 2 agent spills if aerosol infection is possible (including plasmids with oncogenes). Distribute paper towels around the periphery of the spill, then towards the center. When the spill is fully contained, spray 10% bleach or other approved disinfectant on the paper towels, allow 30 minutes contact time, and clean up the paper towels with large forceps. Change gloves, and spray 10% bleach or other approved disinfectant on the surface residue. Wipe up the residue with paper towels and repeat at least once. Dispose all of the paper towel waste in a medical waste bag. Always maintain a biological spill kit in the laboratory that includes the items described in this section.

   2. Risk Group 2 or 3 agent spill inside of a biological safety cabinet: Always ensure that the bottom drain is closed before working at a biological safety cabinet. Use the same techniques described above regarding paper towel placement and disinfectant use, but a 30 minute wait for the initial spill to settle is usually not necessary unless some of the spill occurred outside of the biological safety cabinet. If 10% bleach is used to decontaminate the spill on a stainless steel surface, to prevent corrosion, follow with water or 70% ethanol and wipe dry with paper towels.

14. Mouth Pipetting. Mouth pipetting may lead to accidental ingestion of biohazardous material and is strictly prohibited.
15. Storage. Store all biohazardous materials in containers clearly labeled with the universal biohazard symbol. Permanently label stored biohazardous material with common names wherever possible, in addition to lab-specific codes.

16. Waste. If your work results in the production of medical waste (materials in contact with human and non-human primate tissue, other waste known or suspected to harbor human infectious agents or potentially harbor such agents naturally), you must adopt a Medical Waste Management Plan [7] that includes the use of sturdy red plastic bags imprinted with the universal biohazard symbol and the word "Biohazard" and hard-walled sharps containers (also labeled with the biohazard symbol and the word "Biohazard"). The red-bagged waste can either autoclaved in a unit approved for inactivating medical waste (and registered with the California Department of Public Health) or must be transported to a medical waste accumulation site for disposal in the medical waste stream. Research lab dry waste known or suspected to harbor other types of infectious agents (animal and plant) must also be accumulated in sturdy (non-red) bags and autoclaved (autoclave maintained at the medical waste standard is recommended) before disposing to the landfill. Deface all biohazard symbols before disposing autoclaved biohazardous waste to the landfill. "Biotechnology waste" (with NIH-exempted cloning hosts such as E. coli K-12 or Saccharomyces cerevisiae but free of all infectious agents) can be accumulated in clear autoclave bags (deface any imprinted biohazard symbols) and must be autoclaved before disposal to the landfill. As discussed above, liquid waste of any kind that is contaminated or potentially contaminated with any viable agent (infectious or non-infectious) must be decontaminated by 30 minutes exposure to 10% (final concentration) household bleach before it is disposed in the sanitary sewer.

17. Autoclaves and autoclave safety. The standard autoclave sterilization process is 30 minutes exposure at 121°C (250° F). Large volumes of material require longer exposure times. Always use a sterilization indicator such as autoclave tape. Prion inactivation requires longer exposure at higher temperature, usually preceded by exposure to strong alkali. Always wear heat-resistant gloves, goggles or safety glasses, and a laboratory coat when opening an autoclave. Be sure to allow the superheated steam to dissipate before attempting to remove the autoclave contents. Please refer to EH&S SafetyNet #26 [8].

18. Incidents, Injuries, and health emergencies. Report all injuries and accidental autoinoculation, ingestion or inhalation of infectious agents to the lab director or supervisor, Safety Services Business Office (530-752-1493) and the UC Davis Occupational Health physician (530-752-6051) for evaluation and possible treatment. Dial 911 (or 530-752-1230) immediately for any medical emergency. After normal business hours and on weekends go to Davis Urgent Care (4515 Fermi Place, Suite 105, Davis, Ca. 95618, 530-759-9110, 9am to 9pm daily, directions [9]). If Davis Urgent Care is closed, go to Sutter Davis Hospital (530-757-5111). Any spill, needle stick, or other exposure or release involving infectious agents or recombinant DNA must be reported immediately to the Biological Safety Officer.

19. Emergencies. During natural disasters, fires, power failures, bomb threats, major biohazardous spills, or other emergencies, take the following precautions and evacuate the lab by posted or ordered evacuation routes.

1. Secure infectious materials as quickly as possible. If a biological safety cabinet is being used, close all containers and if possible close the sash.

2. Call 911 (or 530-752-1230) and request emergency response.

3. When the incident is resolved, if the building is safe to enter (at the direction of the incident commander), proceed to the lab, don appropriate PPE, and assess the lab for the disaster-related release of infectious material. Use the above spill control procedures to contain released material.

4. Report any spills involving infectious agents or recombinant DNA to the Biological Safety Officer.
Contact

Biological Safety Office
biosafety@ucdavis.edu 530-752-1493
FAX: 530-752-4527

More information
/biological-safety-staff-listing [6]

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