



## WORKING WITH BIOHAZARDS AT ANIMAL BIOSAFETY LEVELS 1 vs. 2

Research involving infectious biological agents potentially capable of causing human disease must be performed using safety practices that minimize risk to personnel and the environment. Outlined below are the definitions and general requirements for working safely with animals treated with biological agents. At RFUMS, work is permitted only with biological agents that fall into the lowest 2 biological risk categories. These guidelines are not comprehensive and additional information is available in the CDC/NIH publication, [Biosafety in Microbiological and Biomedical Laboratories](#). In addition, the Environmental Health and Safety (EHS) Department and the Institutional Biosafety Committee (IBC) can provide additional information.

### I. DEFINITIONS:

**Animal Biosafety Level 1 (ABSL-1):** This level is used whenever BSL-1 agents are used in live animals.

**Biosafety Level 1 (BSL-1):** *This applies to work involving well-characterized agents not known to consistently cause disease in healthy (immunocompetent) adult humans, and that present minimal potential hazard to laboratory personnel and the environment. (BMBL Section IV).* BSL-1 laboratories are not necessarily separated from the general traffic patterns in the building but must have a door that can be locked to limit access. Work is typically conducted on open bench tops using standard microbiological practices without the use of special containment equipment (the use of a Biological Safety Cabinet (BSC) is generally not required at this level). Potentially infectious material must be decontaminated before disposal. Laboratory personnel must have specific training in the procedures conducted in the laboratory and must be supervised by a scientist with training in microbiology or a related science.

**Animal Biosafety Level 2 (ABSL-2):** This level is used whenever BSL-2 agents are used in live animals. It should be noted that, in some instances, when a BSL-1 agent is put into animals, the level will change to BSL-2/ABSL-2 (an example is xenografting human cells/cell lines into animals).

**Biosafety Level 2 (BSL-2):** *BSL-2 is suitable for work involving agents that pose moderate hazards to healthy adults and the environment. At this level, all precautions used at BSL-1 are followed, and some additional precautions are taken. (BMBL Section IV).* BSL-2 practices build upon those used for BSL-1. Additional procedures for BSL-2 include the requirement that all procedures in which infectious aerosols or splashes may be created are conducted in BSCs or other physical containment equipment. Access to the laboratory must be restricted when work is being conducted and enhanced decontamination is required. Laboratory personnel must have specific training in handling pathogenic agents and be supervised by scientists competent in handling

### II. GENERAL REQUIREMENTS FOR ABSL-1 AND ABSL-2 LEVEL WORK:

- **General:** Eating, drinking, smoking, handling contact lenses, applying cosmetics, and storing food for human consumption are not permitted in any animal procedure or housing rooms of the Biological Resource Facility (BRF).
- **Dress:** No open-toed shoes or bare arms/legs are permitted in any animal procedure or housing room in the BRF. A disposable lab coat is required in all procedure and housing rooms of the BRF.
- **Training:** The PI must ensure that laboratory personnel receive *appropriate training* on working safely with biohazards in animals consistent with their duties initially, annually, and whenever policies or procedural changes occur. (BMBL, Section A.11).

- **Access:** When work with biohazardous agents is ongoing, the PI must *restrict access* to the laboratory (BMBL, Section A.1). Doors to BRF procedure or housing room must be *closed* whenever work with biohazards is ongoing.
- **Signage:** A sign that contains the universal biohazard symbol as well as agent(s) name must be *posted at the room entrance whenever hazardous infectious agents are present*. (BMBL, Section A.9). This includes any BRF animal procedure or housing room.
- **Decontaminate** work surfaces: This must be done *promptly after completion of work*, and after any spill or splash of potentially infectious material using appropriate disinfectant procedures.
- **Sharps:** These must be collected in a *red plastic sharps/biohazard container*. If needles are used, they may not be bent, recapped, or otherwise manipulated by hand before disposal. Non-disposable sharps must be transported in a hard-sided container for decontamination.
- **Transport:** Materials to be decontaminated outside the immediate laboratory must be placed in a durable, leak proof container and *secured* for transport. (BMBL, Section A.8)
- **Chairs in procedure rooms where biohazards are used:** must be covered with a *non-porous material* that can be easily cleaned and decontaminated with appropriate disinfectant.
- **Special Precautions:** Laboratory personnel and particularly *women of child-bearing age* should be provided with information regarding immune competence and conditions that may predispose them to infection. *Personnel with predisposing conditions* should be encouraged to self-identify with the healthcare provider for appropriate counseling and guidance. (BMBL, Section A.11)

### III. ADDITIONAL REQUIREMENTS FOR WORKING AT THE ABSL-2/BSL2 LEVEL

- **Additional Containment Devices:** These include use of a Biological Safety Cabinet (BSC) whenever aerosol-generating procedures involving infectious agents (e.g., vortexing, sonicating, pipetting, harvesting infected tissues from animals) are done.
- **Increased personnel protective equipment (PPE):** This requires the addition of disposable lab coat, disposable gloves, shoe covers and hair covers. Face mask and goggles are encouraged if there is a likelihood of aerosols.
- **Decontamination of all wastes before disposal:** Decontamination can be via steam sterilization or chemical methods and is required before disposal of contaminated materials.
- **Access to materials:** Infectious agents should be stored in a lockable freezer or lab when not in use. Increased hazard signage/communication is best practice.
- **Training/Supervision:** PI must ensure and document (via signed SOPs) that personnel receive lab-specific biosafety training and demonstrate proficiency with procedures before performing independent work at BSL-2 levels. Supervision must be by an individual with advanced training and experience in microbiological techniques. Blood-borne Pathogens training (offered through the EHS Department) is required if working with human source material.
- **Coordination with BRF Management concerning husbandry and SOP practices:** PI and relevant lab personnel who will work with BSL2 treated animals must meet with BRF management to discuss requirements and standard practice for BSL2 work in the BRF. This includes PPE, signage, husbandry, proper disposal of dead animals, dirty caging material, decontamination of work areas, notification and arrangements for reserving space in designated rooms.

### REFERENCES:

CDC/NIH publication *Biosafety in Microbiological and Biomedical Laboratories*, 5th edition  
[https://www.cdc.gov/labs/BMBL.html?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Fbiosafety%2Fpublications%2Fbmb15%2Findex.htm](https://www.cdc.gov/labs/BMBL.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fbiosafety%2Fpublications%2Fbmb15%2Findex.htm)

