

Laboratory Safety Manual

Section 5

Use of Laboratory Animals

INTRODUCTION

PURPOSE

Proper care and use of laboratory animals is not only the humane thing to do, it is the law. Together, Duke's Institutional Animal Care and Use Committee (IACUC) and Division of Laboratory Animal Resources (DLAR), maintain a program which assures compliance with the Animal Welfare Regulations and the Public Health Service Policy on Humane Care and Use of Laboratory Animals. For information about regulatory compliance or to request a copy of the Duke University Manual for Animal Research, contact the DLAR at 919-684-2797.

Employees working with animals in a research environment may be exposed to a variety of occupational risks including animal bites and scratches, needle sticks, back injuries from lifting large items, exposure to zoonotic agents, allergens, or hazardous chemicals, etc. In order to prevent accidents or exposures from occurring, all employees must understand the risks involved with such work, and must also be familiar with basic safety precautions for work with animals.

All proposed work involving animals must first be reviewed and approved by Duke's IACUC before work can begin. The IACUC's homepage is found at: <https://dacup.duke.edu/iacucoawa>

All orders for vertebrate animals must be placed by the DLAR. Purchase orders will be accepted only if accompanied by an approved Animal Use Protocol number.

ANIMAL HANDLING

All employees who work with live animals are required to complete the [Placement Health Review for Animal Handlers](#). This form will be reviewed by Employee Occupational Health and Wellness (EOHW), which administers all applicable medical surveillance. For more information, contact EOHW at 919-684-3136.

Personnel Training:

Duke's IACUC provides animal care and use training sessions which are mandatory for all animal handlers. Required sessions are available [online](#). These trainings provide detailed instruction on both regulatory compliance and basic husbandry. Because hazards vary from lab to lab, it is also necessary for each principal investigator (PI) to provide site-specific instructions for conducting animal work safely. This would include information on any etiologic agents, chemical hazards, radiation hazards, behavioral concerns of a particular animal species, etc. In addition to identifying the risks, the PI is also responsible for providing appropriate personal protective equipment such as lab coats, disposable gloves, goggles and face shields.

Husbandry ([DLAR website](#)):

Animals shall be provided nutritionally adequate food, potable, non-contaminated water and a sanitary environment in which the animal's health shall not be affected.

Injections:

All sharps shall be disposed of immediately after use in an approved sharps container. Needles shall not be broken, bent, or recapped before disposal. A one-handed recapping procedure may be incorporated only after approval by the OESO-Biological Safety Division 919-684-8822. Physical restraint procedures should be developed and practiced to prevent accidental autoinoculation while at the same time reducing stress on the animal.

Animal Restraint:

Proper restraint and handling techniques are essential for reducing stress to laboratory animals, while at the same time allow animal care workers to perform their work with less chance of being scratched, bitten, kicked, etc. Animals can be restrained either manually or with restraint devices. It is the responsibility of the PI to train their staff on proper restraint for each species used.

Changing Bedding:

Precautions should be taken, while changing animal bedding, to minimize or eliminate the aerosolization of hazardous agents which may have been shed by the animal. The use of a [biological safety cabinet \(BSC\) or chemical fume hood](#) should be used when changing animals dosed with hazardous agents. Many allergens can also be aerosolized during bedding changing. Some options include the use of a cage changing station, or decontaminating the soiled bedding before disposal by placing the whole cage in a

biohazard bag and then autoclaving it. Cage changing stations are not appropriate for animals dosed with biohazardous material and autoclaving may not be appropriate for those dosed with chemical toxins. **Please read and adhere to the procedures in the written standard operating procedures (SOP) for handling animals dosed with these hazardous materials.**

Allergens:

Laboratory animal allergies and associated asthma are among the most common conditions affecting individuals who work with laboratory animals. Typically, allergies to animals result from repeated exposure to an animal's dander, urine, saliva, serum, or other body tissues. Symptoms can range from mild (e.g. itchy or runny nose and eyes) to severe (e.g. shortness of breath or red, itchy wheals on skin).

Levels of airborne allergens tend to rise significantly with certain activities such as changing or cleaning animal cages. To reduce the levels of airborne allergens, OESO recommends using:

- Ventilated hoods (cage changing station, biological safety cabinet (BSC), or chemical fume hood) for cage changing
- Dust-free bedding, or
- Filtered caging systems.

If these options aren't available or feasible for a particular situation, then personal respiratory protection may be required. Contact Occupational Hygiene and Safety (919-684-5996) for more information about respirators. Make an appointment with Employee Occupational Health and Wellness (919-684-3136) or Student Health (919-681-WELL) if you have allergy concerns.

Carcass Disposal:

All **non-radioactive** animal carcasses are to be collected by the DLAR staff and incinerated. For more information, contact the DLAR at 919-684-5567.

Radioactive carcasses and their associated lab waste (i.e. bedding, excreta, sharps, etc.) are to be bagged and sealed in 3 mil plastic bags. **Make sure that all sharps are contained in a puncture resistant container before placing in plastic bags!** Once properly barcoded, the bags are refrigerated in a lined 30 gallon plastic drum. All packaging and labeling materials are provided by the OESO. For more information contact the OESO- Environmental Programs Division at 919-684-2794.

WORKING WITH HAZARDOUS MATERIALS

Standard operating procedures (SOPs) must be developed and approved by OESO for any work which involves the use of hazardous materials in animals. Such procedures shall detail the safe handling of the animal throughout the duration of exposure.

- For work with **biological agents** in animals, see the [Guide for Developing an SOP for the Use of Biohazards in Animals](#). Contact Biological Safety Division (919-684-8822) for assistance.

Animal Biosafety Levels (ABSL):

Work involving the exposure of animals with biological materials must be conducted at the appropriate containment level to ensure adequate protection of personnel and the environment. The following table summarizes the Center for Disease Control and Prevention's four animal biosafety levels.

ABSL	Agents	Practices	Safety Equipment (Primary Barriers)	Facilities (Secondary Barriers)
1	Not known to cause disease in immunocompetent adult humans	Standard animal care and management practices, including appropriate medical surveillance programs	As required for care of each species	Standard animal facility <ul style="list-style-type: none"> non-recirculation of exhaust air directional air flow recommended
2	Associated with human disease. Hazard: autoinoculation, ingestion, mucous membrane exposure	ABSL-1 practices plus: <ul style="list-style-type: none"> limited access biohazard warning signs sharp precautions biosafety manual decontamination of all infectious wastes and of animal cages prior to washing 	ABSL-1 equipment primary barriers: <ul style="list-style-type: none"> containment equipment appropriate for species: PPE: laboratory coats, gloves, face and respiratory protection as needed 	ABSL-1 facility plus: <ul style="list-style-type: none"> autoclave available handwashing sink available in the animal room

ABSL	Agents	Practices	Safety Equipment (Primary Barriers)	Facilities (Secondary Barriers)
3	Indigenous or exotic agents with potential for aerosol transmission; disease may have serious or lethal consequences	<p>ABSL-2 practices plus:</p> <ul style="list-style-type: none"> • controlled access • decontamination of clothing before laundering • cages decontaminated before bedding removed • disinfectant foot bath as needed 	<p>ABSL-2 equipment plus:</p> <ul style="list-style-type: none"> • containment equipment for housing animals and cage dumping activities • Class I or II biosafety cabinets available for manipulative procedures (inoculation, necropsy) that may create infectious aerosols. PPE: appropriate respiratory protection 	<p>ABSL-2 facility plus:</p> <ul style="list-style-type: none"> • physical separation from access corridors • self-closing, double door access • sealed penetrators • sealed windows • autoclave available in facility
4	Dangerous/exotic agents which pose high risk of life-threatening disease, aerosol-transmitted lab infections; or related agents with unknown risk of transmission	<p>ABSL-3 practices plus:</p> <ul style="list-style-type: none"> • entrances through change room where personal clothing is removed and laboratory clothing is put on; shower on exiting • all wastes are decontaminated before removal from facility 	<p>ABSL-3 equipment plus:</p> <ul style="list-style-type: none"> • maximum containment equipment (i.e. Class III biosafety cabinet or partial containment equipment in combination with full body, air supplied positive-pressure personnel suit) used for all procedures and activities 	<p>ABSL-3 facility plus:</p> <ul style="list-style-type: none"> • separate building or isolated zone • dedicated supply/exhaust, vacuum and decontamination systems • other requirements outlined in the complete description of ABL-4

Summarized from [Biosafety in Microbiological and Biomedical Laboratories, 5th Edition, 2009.](#)

- For work with **hazardous drugs or other toxic chemicals** in animals, see the [SOP for Work with Toxic Chemicals in Animals](#). Contact Occupational Hygiene and Safety (919-684-5996) for assistance.
- For work with **radioactive materials** in animals, use [Radiation Safety's Animal Care and Use Protocol Wizard](#) online or contact the Radiation Safety Division (919-684-2194) for questions about SOP development.

Safe Use of Anesthetic Gases:

Many anesthetic gases are used at Duke University for performing animal surgeries. These gases can present a risk for potential exposure to the lab personnel performing the surgeries. Anesthetics of concern include ether, nitrous oxide, and halogenated agents (e.g. halothane, isoflurane, methoxyflurane). Some of these halogenated anesthetics have been linked to adverse health effects in exposed workers, such as reproductive and neurological effects. Emphasis must be placed on protecting personnel from exposure by adequately “capturing” the waste gas being generated. This may be accomplished by several methods depending on the method of delivery of the gas:

For enclosed chambers (e.g. Bell jar)-

- Perform work in a fume hood so when lid is removed, gases are captured by hood.
- Evacuate chamber via building vacuum system prior to removing lid.
- Make sure the chamber lid is tight-fitting.
- Remove chamber lid only when animal is being placed into or removed.

For anesthetic gas machines and vaporizers-

- Verify that proper filtration canisters are installed.
- Maintain filter canisters according to manufacturer's specifications.
- Choose an appropriate sized face-piece to ensure most efficient waste gas recovery.
- Maintain anesthesia machines and vaporizers according to manufacturer's instructions and in accordance with the Animal Care and Use Program's [Policy on Safe Use of Anesthetic Gases](#).

Lab personnel who are concerned with possible exposure to anesthetic gases may contact the Occupational Hygiene & Safety division of OESO at 919-684-5996 to request an exposure risk evaluation.

REFERENCES

Guide for the Care and Use of Laboratory Animals
NIH Guidelines for Research Involving Recombinant DNA
Biosafety in Microbiological and Biomedical Laboratories