



University of Louisville
Department of Environmental Health and Safety
Office of Research Services
Office of Health Services

Introduction to Occupational Hazards Associated with the Care and Use of Laboratory Animals

Introduction and Purpose

University faculty, staff and students who work with research animals face a number of occupational risks, the extent of which varies widely. The diversity of hazards associated with animal research is tremendous. Animals bite, scratch, and kick; moving bulky animal cages can result in sprains and strains; and electricity, machinery, and noise can cause injury. Chemicals are ubiquitous in the laboratory and animal room environments; chemicals are used to disinfect and clean surfaces, anesthetize animals, and process tissue samples. Research protocols can introduce toxic chemicals, human pathogens, or radioactive materials into animals, and these agents can enter the waste stream of the animal facility.

This brochure is designed to acquaint you with the risks associated with animal experimentation. Please note that this brochure does not supply you with all the information needed to completely assess the occupational risks associated with animal care and use. Rather, it is a brief summary of some of the hazards you may encounter along with some important health and safety tips. It is therefore important that you consult the Department of Environmental Health and Safety, the Offices of Research Services (Comparative Medicine Research Unit) and Health Services, as well as referenced documents, for a thorough discussion of the hazards found in your research plan along with a discussion of appropriate safety precautions and methods of hazard control.

Allergies

Allergic reactions to **animals** are among the most common and most important of the occupational hazards associated with the care and use of laboratory animals. Allergic symptoms (including respiratory and skin disorders; eye, nose and throat irritation; and skin hives) are present in an estimated 10 – 40% of animal care workers. Up to 10% of laboratory workers will develop occupation-related asthma. If you already have hay fever or other allergies, chances are you will eventually develop an allergy to laboratory animals. **Occupational asthma**, a much more serious condition, presents itself as coughing, wheezing, and shortness of breath. Occupational asthma can be severe, disabling, and persistent. It can lead to permanent disability and may require removal of all exposure sources or even a career change. **Pre-placement screening** can be helpful in identifying and alerting persons who might be at risk for developing laboratory-animal allergy or asthma and educating them to take protective measures.

Latex allergy, which is a reaction to certain proteins in latex rubber, is also not uncommon. Symptoms may begin within minutes of exposure or can occur hours later. Mild reactions to latex involve skin redness, hives or itching. More severe reactions may involve respiratory symptoms such as runny nose, sneezing, itchy eyes, scratchy throat, and asthma.

Bites, Scratches, & Related Hazards

Bites, scratches, and kicks are ubiquitous hazards associated with laboratory animal contact. They are largely **preventable through proper training** in animal-handling techniques. People working with large animals such as calves or pigs should be especially careful as they can sustain crushing injuries when the animals kick, fall, or simply shift their body weight.

Be aware of factors or situations that might precipitate a traumatic event in a research animal. High pitched noises, quick movements, and inappropriate handling can frighten an animal and result in an unexpected response that injures the animal handler. **Knowledge of animal behavior** is important in reducing risks.

Even though an animal bite may appear inconsequential, personnel should be aware of the host of diseases that can be spread by this mechanism. Complications can result from contamination of the wound by the normal oral flora of the animals involved.

Personnel who have sustained an animal bite should seek medical attention. **Campus Health Services** is available in the event of an animal bite or other occupational injury. Early intervention can limit the progression of a localized infection and avert the more serious complications of wound infection.

Zoonoses

The risk of acquiring infectious agents from contemporary laboratory animals is actually quite low. However, because many zoonotic agents can be quite serious or even life threatening, the hazard posed to personnel working with research animals should not be minimized. A partial listing of zoonotic diseases is included below:

- Q Fever (*Coxiella burnetii*) – ruminants, especially pregnant sheep
- Toxoplasmosis (*Toxoplasma gondii*) – cats
- Rabies (Rabies virus) – carnivores, especially those of wild or unknown origin
- Cat Scratch Disease (*Bartonella henselae*) – cats
- Rat Bite Fever (*Streptobacillus moniliformis*) – wild rats
- Ringworm (various dermatophyte fungi) – cats, cattle
- Fish rose (*Erysipelothrix* sp. and *Mycobacterium* sp.) – fish/aquaria
- Hantavirus – wild rodents
- Monkey B (*Herpesvirus simiae*, Herpesvirus B) – macaques

Infectious Agents & Biological Hazards

Biological hazards include pathogenic **microorganisms**; experimentally and naturally infected **animals**; tissues of infected animals; human **tissues**, blood and body **fluids**; human **cell lines** (including established cell lines); cell lines of non-human primates; and **recombinant or synthetic nucleic acid molecules**. Infectious agents are classified on a scale of 1 to 4, in increasing risk. Research at UofL is currently limited to **Biosafety Levels 1, 2, and 3**.

Because of their potential for direct contact with concentrated stocks of infectious agents, laboratory personnel are at the greatest risk for occupationally acquired infections. Investigators wishing to conduct research activities involving experimentally or naturally infected animals should review the CDC/NIH publication *Biosafety in Microbiological and Biomedical Biological Laboratories, 5th edition*, for a thorough review of appropriate safety practices and procedures. The UofL requires investigators working with all biological hazards to register their research with the **Institutional Biosafety Committee (IBC)** to ensure compliance with all regulatory requirements.

Toxic Chemicals & Hazardous Drugs

It is during the preparation of **stock solutions** of carcinogens, reproductive toxins, and other highly toxic agents where chemicals are manipulated in their pure or concentrated state that the greatest potential for a significant exposure resides.

Anesthetic agents are frequently used in animal experimentation. Inhalation anesthetics as a class have been identified as reproductive toxins and are associated with an increased risk of spontaneous abortion and other

reproductive effects in both women and wives of exposed men. Additionally, individual anesthetics may be carcinogenic or toxic to major organ systems such as the liver or kidneys. **Proper ventilation**, whether by a scavenging device, use of a fume hood, or other local exhaust ventilation, is vital in maintaining ambient concentrations of anesthetic gases as low as possible.

Ethylene oxide is a carcinogen that is used as a sterilant gas for items that cannot be autoclaved. The use of sealed bag systems inside a properly functioning fume hood makes it possible to use ethylene oxide for its intended purpose with no detectable exposure to personnel.

Animal facilities and laboratories frequently employ copious quantities of chemical disinfectants and cleaners. Although usually quite safe in their diluted form, handling of concentrated chemicals often requires special handling procedures. The **Material Safety Data Sheet (MSDS)** should be consulted for proper handling of such substances.

Radiation

Radiation is a diverse area that can present a hazard through inhalation, ingestion, skin contact, or proximity. Below are a few examples of the use of radiation in the laboratory. For each of these, consultation with the **UofL Radiation Safety Officer** (852-5231) is required prior to agent acquisition or use.

Radioisotopes

- Class 1 – low energy beta emitters such as ^3H , ^{14}C , and ^{35}S
- Class 2 – high energy beta and gamma emitters such as ^{32}P , ^{125}I , ^{131}I , and ^{22}Na
- Class 3 – animals containing microspheres

Non-ionizing Radiation (e.g. ultraviolet radiation)

- germicidal lamps
- transilluminators

Lasers (Class 3 and 4, which may be hazardous to skin and eyes)

Animal Laboratory Hazard Information (ALHI)

Animals exposed to potentially infectious microorganisms or other biological hazards, chemicals that could result in shedding of toxic metabolites, or radioactive materials are housed in special areas or designated rooms. Additional housing requirements, entry precautions, and signage may also be needed. The ***Animal Laboratory Hazard Information (ALHI) sheet***, designed specifically for the hazardous agent and host species, provides an outline of appropriate safety practices and procedures. A copy of the ALHI must be placed on the door of the housing room.

Physical Hazards

“Sharps” are ubiquitous in animal care. Needles, broken glass, syringes, pipettes, scalpels – all are commonly used in animal facilities and laboratories. ***Avoid recapping used needles***; dispose of them in designated puncture proof containers. When disposing of sharps remember to segregate them away from regular trash so that custodial staff is not exposed to cuts, puncture wounds, infectious agents, or hazardous chemicals. Locate sharps disposal containers as near the point of use as possible. Traveling across a room to dispose of a scalpel, needle, or syringe is one of the most common causes of accidental needle stick/puncture.

Electrical hazards are found throughout animal and laboratory facilities, which are frequently wet areas. Equipment that has frayed or damaged cords should not be used. Electrical cord splices and repairs made with electrical tape are not acceptable, as the tape does not check current flow. Substitute outlet strips for extension cords and octopus-type plug extenders.

Compressed gas cylinders are found routinely in laboratories and animal facilities. These cylinders are under high pressure and contain enormous amounts of energy. An uncontrolled release of energy from a typical five-foot compressed gas cylinder can easily propel the cylinder through a concrete block wall. Such an uncontrolled release can occur when a cylinder is knocked over. To protect against this potential,

secure all compressed gas cylinders, even those marked “empty”, by a wall chain, bracket, or base. Replace the protective valve stem cap when the cylinder is not in use.

Working with heavy animals and equipment can stress muscles and joints. **Cumulative trauma injuries** including carpal-tunnel syndrome, tennis elbow, and bursitis are possible from repetitive motions associated with animal husbandry. **Wet floors** in animal rooms and cage wash areas increases the risk of slips and falls. The risk of **back injury** is real in animal care; proper lifting technique is imperative.

Exposure to excessive **noise** over several years may result in permanent hearing loss. This is hardly an issue in rodent facilities. Animal rooms housing dogs or pigs are another situation entirely. These animals in particular are known for their persistent and loud vocalizations that can reach intense levels inside the confines of the holding facility. Equipment such as cage washers may also produce excessive sound levels.

Medical Conditions That May Increase Risk

Some medical conditions may increase an individual’s risk of developing an occupationally acquired infection. Any given individual’s risk will depend on a **combination of factors** including the individual’s health history, type of research animals, and type of chemical agents and biological agents used. Individuals who are immunocompromised, such as patients receiving chemotherapy, corticosteroids (e.g. prednisone), or radiation therapy, are at greater risk of acquiring an occupational illness. A patient with HIV, leukemia, organ transplants, kidney failure or certain medications that make their immune systems weak should work closely with an occupational health physician to better assess their personal risk when exposed to research animals and laboratories. Research assistants should also be aware that some conditions such as animal allergies develop over long periods of time. Individuals should be educated to recognize the symptoms and seek medical advice should they develop.

For More Information, Contact:

- Office of Research Services, Comparative Medicine Research Unit, Veterinary Care Staff, 852-5268.
- Department of Environmental Health and Safety, 852-6670.
- Campus Health Services
 - HSC Outpatient Care Center, Suite 110, 852-6446.
 - Belknap, 215 Central Ave., Suite 110, 852-6479

References:

- National Research Council. Occupational Health and Safety in the Care and Use of Research Animals. National Academy Press, Washington, D.C.
- Centers for Disease Control. Biosafety in Microbiological and Biomedical Laboratories. U.S. Government Printing Office, Washington, D.C.
- National Research Council. The Guide for the Care and Use of Laboratory Animals. National Academy Press, Washington, D.C.
- NIH Office of Biotechnology Activities. *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules*.