

OCCUPATIONAL HEALTH AND SAFETY HAZARDS IN THE ANIMAL RESEARCH SETTING

The purpose of this document is to provide information about the health and safety hazards associated with working with research animals and to summarize basic safety prevention practices.

Hazard Categories

The general hazards associated with the care and use of research animals include:

1. Bites, scratches, kicks
2. Allergens
3. Zoonoses
4. Protocol Related Hazards
5. General Safety Hazards

1. Bites, Scratches, Kicks

Bites, scratches and kicks are ever-present hazards associated with research animal contact and work with related equipment. Employees should be properly trained in animal handling, general restraint techniques, and environmental factors for the species they will work with. In addition, all staff should be familiar with first aid procedures specific to each species and the incident reporting process.

2. Allergens

One of the most common health risks in the research animal setting is allergic reaction to lab animals. It is estimated that anywhere from 10% to 44% of animal care workers will develop allergic symptoms to the animals. In addition, an estimated 10% of workers will eventually develop occupation-related asthma. The risk of developing an allergy depends on many factors such as animal species contact, facility and ventilation design, and the employee's personal health status. For example, individuals with certain respiratory conditions or pre-existing allergies may be at higher risk of developing lab animal allergies and/or experiencing more severe allergic reactions.

Symptoms of allergic reaction may vary and can include any of the following:

- Contact urticaria with symptoms such as skin redness, itchiness, welts or "hives"
- Allergic conjunctivitis with symptoms such as sneezing, eye itchiness, clear nasal drainage, or nasal congestion
- Allergic rhinitis with symptoms such as sneezing, nose itchiness, clear nasal drainage, nasal congestion
- Asthma with symptoms such as cough, wheezing, chest tightness, or shortness of breath
- Anaphylaxis with symptoms such as generalized itching, hives, throat tightness, eye or lip swelling, difficulty swallowing, hoarseness, shortness of breath, dizziness, fainting, nausea, vomiting, abdominal cramps, diarrhea

People may be allergic to any animal species. The allergens are proteins that are excreted in animals' saliva, urine, and from various glands associated with the skin. The proteins tend to be sticky and become associated with the animal's hair and with particles of dander. The allergens are unique to each species of animal, so it is possible to be allergic to one species but not another. It is also possible to be allergic to multiple species.

The most effective way to control and prevent allergies is to minimize exposure to the allergens by the use of:

- Engineering controls, such as biosafety cabinets or downdraft tables.
- Personal protective equipment, such gloves, gowns, hair/shoe covers, N95 respirator masks, and safety goggles.

- Work practices, such as opening cages in biosafety cabinets, handwashing/showering after handling animals, and keeping cages/work area clean.

If you have animal allergies or think you may be at risk of developing allergies as a result of working with animals, you should contact your health care provider and/or the Environmental Health & Safety Occupational Health Nurse at 858-534-8225 to get advice about the best methods to use to protect yourself.

3. Zoonoses

Zoonoses are any infectious diseases that can be transmitted from non-human animals to humans or from humans to non-human animals. People can be exposed to zoonoses in laboratories, farms, zoos, aquariums, veterinary hospitals, the field (wild), as well as from pets at home. The transmission of zoonotic disease in the laboratory-animal environment is uncommon because many laboratory species today are bred to be free of zoonoses and there is also ongoing veterinary screening of animals in the research setting which rapidly identifies any disease occurrence. However, laboratory and farm animals still can be infected with zoonotic agents, some of which can be life-threatening to humans. Field research with wild species remains an important source of exposure to zoonotic agents.

Learning about zoonotic diseases is an important part of working safely with research animals. Being aware of the potential zoonotic disease risks for the animals you will work with helps you to understand and implement many safe work practices and procedures that can prevent transmission of infectious agents between animals and humans. In addition, if you experience an illness that may be related to your animal work, it is important to be aware of zoonotic disease risk so you can notify the medical professionals of your work exposure to assist with proper diagnosis and treatment.

Although a normal, healthy adult person may have only mild symptoms of a zoonotic disease, that person may unknowingly spread the disease to others, including family members, who may be susceptible to more serious consequences of infection, such as severe illness or death. Some individuals may be at increased risk for zoonotic infection due to personal health status, such as during pregnancy or with immune compromised conditions (e.g., long-term steroid use, cancer/cancer therapies, kidney/liver disease, removal of spleen, diabetes, AIDS/HIV infection). If you have questions or concerns about your health status or risk for working with research animals, you should contact your health care provider and/or the Environmental Health & Safety Occupational Health Nurse at 858-534-8225.

What infectious agents can cause zoonotic infection?

Many biologic agents can cause zoonotic disease, including:

- Viruses: Lymphocytic choriomeningitis virus (LCMV), Hanta virus, Herpes B, Herpes simplex, measles, pox viruses, rabies
- Bacteria: Salmonella, Shigella, Campylobacter (gastrointestinal diseases); Chlamydia psittaci (psittacosis; a bird disease); mycobacterium tuberculosis; brucella; coxiella burnetti (Q fever); streptobacillus moniliformis (rat bit fever); rochalimaea henselae (cat scratch disease); clostridium tetani (tetanus); mycobacterium marinum (an aquatic infection); erysipelothrix rhusiopathiae (a marine animal infection).
- Fungi: dermatophytes (ringworm)
- Protozoans: giardia, cryptosporidium, entamoeba (gastrointestinal diseases); toxoplasma gondii (toxoplasmosis).
- Worms: Hymenolepis spp (tape worm)
- Arthropods: mites, mosquitos

How are zoonotic agents spread?

Infectious agents may be present in body fluids and secretions such as blood, saliva, urine, feces, respiratory secretions and in animal tissues. Exposure routes include:

- Respiratory (inhalation)
- Fecal/Oral (ingestion)
- Mucous membrane (eyes, nose, mouth)
- Parenteral (through breaks in the skin via cuts, bites, scratches, needle sticks, etc.)

If you are exposed through a bite, scratch, needle stick, aerosol droplet, mucosal secretion, feces or urine, you should immediately notify your supervisor or Principal Investigator and seek medical evaluation.

4. Protocol Related Hazards

Research protocols can introduce chemicals, biologic agents, flammable substances, or radioactive materials into animals, which then can enter the hazardous waste stream of the animal facility. Protocol-related hazards are protocol-specific and protocols are reviewed by appropriate committees, such as the Institutional Biological Committee (IBC) and Institutional Animal Care and Use Committee (IACUC), and/or EHS specialists to identify hazards prior to the approval of protocols. When significant hazards are identified, a safety considerations meeting is required with the staff who will be handling animals that are part of the specific protocol.

5. General Safety Hazards

There are general physical hazards that can be present in any work environment, including animal research work areas. The general safety hazards include:

- Ergonomic hazards caused by tasks that require repetitive motion, lifting, or awkward body postures.
- Slip, trip and fall hazards caused by various work processes, lighting requirements, housekeeping practices.
- Sharp injury hazards caused by needles, broken glass, pipettes, scalpels, etc.
- Flammable material hazards caused by improper use or storage of flammable hazards
- Pressure vessel hazards related to compressed gas cylinders, autoclaves, high-pressure washing equipment, etc. Equipment should be properly secured and maintained.
- Electrical hazards related to the use of various electrical equipment can be minimized by proper maintenance, engineering controls (ground-fault interrupters), and operational procedures such as lock-out/tag-out procedures.
- Ultraviolet radiation and Laser hazards require appropriate engineering controls (e.g., shielding, interlocking devices) and/or personal protective equipment. Special training is required for work involving lasers.
- Machinery hazards may include pinch, nip or crush points related to moving parts. It is important to be trained on equipment use and follow safe work practices, including use of guarding.
- Noise hazards can result from animals, especially pigs and dogs, and from equipment such as cage washers. If acceptable noise levels cannot be achieved with engineering controls, administrative controls (e.g., time limits) or personal protective equipment (hearing protection) will be required. Annual hearing testing is required for employees working in designated noise areas.
- Chemical hazards related to the use of disinfectants, pesticides, anesthetic gases, and tissue preservatives, as well as protocol-related use of chemicals. Another source of chemical hazards is the disposal of bedding and other waste materials from experimental procedures.

Hazard Control

The occupational health and safety program provides guidelines designed to protect employees from the hazards associated with the care and use of research animals. However, the primary responsibility for maintaining good health and safety lies with each individual. Personnel should

always follow safety guidelines and exercise common sense. In general, a risk assessment identifies the potential hazards and level of risk. Once risks are identified, measures are planned and implemented to minimize or eliminate the risks. The following basic safety guidelines apply to all work situations, regardless of specific hazards present:

- Risk Assessment:
 - Learn about the animals you work with
 - Review work tasks for potential hazards
 - Enroll in the Occupational Health and Safety Program for Researchers with Animal Contact (<http://blink.ucsd.edu/safety/research-lab/vivarium/occupational.html#risk>).
 - Notify your supervisor or PI if you have questions, need additional training, or have concerns about workplace hazards.

- Preventive Measures:
 - Complete required training
 - Only work with animals for which you have adequate training in safe handling techniques
 - Review protocols and/or exposure control plans; understand potential health and safety hazards.
 - Know how to protect yourself against hazards in your work area
 - Read and follow all safety signs and instructions in lab and animal areas
 - Use engineering controls whenever possible (biosafety cabinets, downdraft tables, ventilated hoods, etc.)
 - Use appropriate protective clothing (gloves, gowns, hair/shoe covers, eye protection, masks, respirators, etc.) and remove after animal contact
 - Launder protective clothing at work or by a professional service. Don't take protective clothing home. Don't wear clothing/shoes worn around animals anywhere else.
 - Know what types of work require additional protective devices such as safety glasses or goggles, face shields, special gloves, masks, or respirators.
 - Wash hands after removing gloves. Wash hands frequently and avoid touching your face while working with animals.
 - No food or drinks in areas where animals, their wastes or body products are present.
 - Use extreme care when using needles or other sharps; never recap needles.
 - Know basic first aid measures for animal bites, scratches, etc.
 - Know how to report exposures, accidents, injuries and illnesses.
 - Know emergency, spill, and evacuation procedures
 - Follow proper work practices for disinfection and waste disposal.
 - Notify your supervisor or PI of any questions, safety concerns, work exposures or incidents, or need for additional training.

Sources of Information

There are many sources of information on zoonoses, some of those most pertinent to the needs of a research community, are:

1. *Occupational Health and Safety in the Care and Use of Research Animals* (National Academy Press, 1997)
2. CDC National Center for Zoonotic, Vector-Borne and Enteric Diseases
<http://www.cdc.gov/nczved/divisions/dfbmd/>
3. CDC Biosafety in Microbiological and Biomedical Laboratories (BMBL 5th Edition)
<http://www.cdc.gov/biosafety/publications/bmbl5/index.htm>
4. University of California, Davis, Safety Services: Zoonosis Information by Species
<http://safetyservices.ucdavis.edu/programs-and-services/occupational-health/animal-care-and-use-occupational-health-program-1/ucd-policy-procedures-educational-materials/zoonosis-information-by-species/zoonosis-information-by-species>
5. University of California, Davis, Safety Services: Risk Assessment of Zoonotic Diseases by Species

<http://safetyervices.ucdavis.edu/programs-and-services/occupational-health/animal-care-and-use-occupational-health-program-1/ucd-policy-procedures-educational-materials/risk-assessment-of-zoonotic-diseases-by-species/risk-assessment-of-zoonotic-diseases-by-species>

6. University of California, Davis, Safety Services: Hazard Analysis Tool

<http://safetyervices.ucdavis.edu/programs-and-services/occupational-health/animal-care-and-use-occupational-health-program-1/ucd-policy-procedures-educational-materials/hazard-analysis-tool>