



BAYLOR
UNIVERSITY

Animal Worker Health & Safety

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SECTION 1: INTRODUCTION

PURPOSE

The purpose of this occupational health and safety program (OHSP) is to reduce to an acceptable level the risk/hazard associated with use of vertebrate animals in research, teaching and outreach, consistent with an overall institutional focus on maintaining a safe and healthy workplace. An OHSP for employees and students involved in animal care and use is an important component of the institution's overall animal care and use program. Topics addressed include:

- risk assessment
- personnel training
- standard operating procedures
- facilities
- medical evaluation
- preventive medicine

The health and safety needs of these individuals are addressed in the context of existing environmental health and safety programs at Baylor University, e.g., blood-borne pathogens, chemical hygiene, respiratory protection, handling/disposal of hazardous waste materials, radiological safety, biological use authorization, and containment and handling requirements for biological agents

COMPLIANCE STANDARDS

Baylor University is required to have an OHSP to be in compliance with Public Health Service (PHS) policy and with federal regulations. Resource materials for requirements and/or recommendations pertaining to this OHSP include:

- **Guide for the Care and Use of Laboratory Animals Eighth Edition** (National Research Council, 2001) and
- **Occupational Health and Safety in the Care and Use of Research Animals** (National Research Council, 1997).

A description of our OHSP must be included in the Baylor University Animal Welfare Assurance that is required by the PHS. The effectiveness of Baylor University's OHSP ultimately relies on effective interactions among several institutional functions or activities:

- research and teaching program directors
- Institutional Animal Care and Use Committee (IACUC)
- Attending Veterinarian
- Animal Program Director
- Department of Environmental Health and Safety (EHS)
- Concentra Medical Center
- facility-maintenance personnel

- administrative support
- and on the performance of safe practices by all personnel in contact with animals or animal tissues.

PARTICIPANTS

- Those involved in the direct care of animals (including part-time employees)
- Research investigators and their technical staff
- Instructors
- Students having animal contact through research projects
- Others having direct contact with animal tissue, fluids or wastes
- Relevant personnel involved in facilities maintenance, custodial services, security

The OHSP is provided for all personnel involved in activities applicable to the Baylor University Assurance of Compliance with the Public Health Service (PHS) policy on Humane Care and Use of Laboratory Animals. Applicable in the University's Assurance of Compliance are all research experimentation, research training, biological testing and related activities involving live, vertebrate animals whether the activities are supported by the PHS, or are not supported by the PHS but are housed in Baylor University facilities.

Enrollment in the OHSP applies to all workers who contact research animals for which there is increased risk of animal related injury or illness. An employee or student is at an increased risk if they are exposed to live, vertebrate animals in a way that gives them an increased risk of an occupational illness, such as a zoonotic disease, physical injury, or allergy.

Certain animal contact/projects pose little health risk to individuals and may be exempted from the program. Exemptions may be given for projects that involve the observation of animals or for other uses that pose no increased risk. Questions concerning potential exemptions should be directed to the Animal Program Director. Students who are only exposed to animals in a classroom setting are not required to enroll in the OHSP; however, it may be considered a prudent practice to offer them the opportunity to enroll.

At the time of enrollment, all participants will be provided a health questionnaire (History and Risk Assessment Survey). Completed questionnaires will be reviewed by an occupational health physician (OHP). The questionnaire deals with anticipated or actual exposure to animals at work, immunization status with regard to rabies and tetanus, and any existing medical condition that creates an animal contact health risk. Physical examinations and counseling are based on the functional requirements of the position, the type of animal contact, and the individual's prior medical history.

Aside from the OHSP per se, oversight of occupational health and safety issues is provided by the IACUC, Institutional Biosafety Committee and the Department of Environmental Health and Safety. The IACUC, for example, requires certification by PIs/facility contacts that all individuals working with animals, animal tissues, or animal products on an approved protocol be informed of relevant occupational health and safety issues prior to performing their duties.

Moreover, occupational health and safety issues are topics for consideration by the IACUC in its semiannual site inspections and programmatic reviews.

PROGRAM SUPPORT

Department of Environmental Health and Safety (EHS)

Responsibilities of EHS include conducting safety training in:

- chemical hygiene/laboratory safety
- chemical waste management
- radiological safety
- medical waste management
- blood borne pathogens
- respiratory protection
- participation in any required annual training by notification of personnel and coordination of activities
- oversight and record keeping pertaining to training activities
- site inspections and/or other issues pertaining to compliance and enforcement in OHSP
- participation in certain aspects of the medical monitoring program, e.g., identifying need for auditory testing and/or respiratory protection and assessment of exposure to radiation
- record keeping and investigations with regard to accidents/injuries/adverse incidents
- and providing consultation to participants or employing units on topics such as ventilation, storage of hazardous materials, and engineering controls (e.g., biological safety cabinets).

Concentra Medical Center

Concentra Medical Center provides medical services and counseling associated with entry medical evaluation and surveillance recalls (e.g., annual reviews, tetanus boosters, rabies antibody titers). With entry evaluations, Concentra Medical Center will notify Environmental Health & Safety (EHS) to indicate approval, non-approval or accommodations required for enrollees to work with the animal species specified on **Form C, the Risk Assessment and Review Questionnaire**. Concentra Medical Center is responsible for notifying enrollees of medical follow-ups. Records documenting status of entry medical evaluations and surveillance recalls are maintained by Concentra Medical Center. EHS will track enrollment in the program and will notify users when it is time for their annual recertification.

Institutional Animal Care and Use Committee (IACUC)

Baylor University's Institutional Animal Care and Use Committee (IACUC) is a standing committee that oversees animal use and care at Baylor. The charge of the IACUC is to assure the humane care and use of animals utilized in biomedical and behavioral research, teaching, and testing. Every effort is made to follow all federal, state, and local laws and regulations that govern the care and use of animals in these manners. Specific guidance can be found in the

Animal Welfare Act, the Public Health Service Policy on Humane Care and Use of Laboratory Animals, and the Guide for the Care and Use of Laboratory Animals.

This IACUC web site is provided by the Office of the Vice Provost for Research to assist those involved with animal research to meet the basic requirements necessary to be in compliance and help Baylor personnel through the processes required to meet those obligations. All animal use and research must be reviewed and approved by the IACUC prior to ordering, breeding or using animals in research, teaching or testing at Baylor. The IACUC is responsible for assuring appropriate use, care, and treatment of all vertebrate animals used for University activities, and has the authority to approve or withhold approval of protocols for all such activities involving animals in accordance with the Public Health Service Policy on the Humane Care and Use of Laboratory Animals regulations of the Animal Welfare Act (Public Law 99-158).

Institutional Biosafety Committee (IBC)

The IBC is charged by the President of Baylor University with responsibility for the regulation of biohazardous materials, including human and animal pathogens, plant pathogens, toxins, allergens and recombinant DNA. PIs using biohazardous materials within Baylor University facilities must receive authorization for biological use from the IBC. The Baylor University Biosafety Program, under the auspices of the IBC, is heavily dependent on the PI to ensure the safety of students, faculty and staff, visitors, and the environment.

Radiological Safety Committee (RSC)

All work with radioisotopes conducted at Baylor University must be approved by the RSC.

Other Baylor University safety programs applicable to laboratories that work with biological agents include the Chemical Hygiene Plan, the Baylor University Chemical Waste Management Program, Blood-Borne Pathogens and Respiratory Protection.

SECTION 2: PROGRAM REQUIREMENTS

You must participate in the OHSP if you are faculty, staff, or student and you come into contact with animals. Both research and non-research animals have the potential to cause injury, transmit zoonotic disease, and/or cause allergic reaction to those who have contact. This can be either direct contact from handling an animal or just from being in close proximity, i.e., working or passing through an animal housing room. Staff members or qualified students who have these types of exposures must be provided with the appropriate awareness training. Understanding routes of disease transmission, disease or allergy signs and symptoms, personal protective equipment, waste handling, and emergency contacts are very important. The required training and medical review is intended to inform you of the risks associated with your particular animal exposure and how you can best prevent illness or injury.

Prior to work with research animals and admittance to the animal facilities, you need to:

- Complete the web-based training Health and Safety for Personnel with laboratory Animal Contact and contact Environmental Health and Safety to complete the medical review process.
- Complete Form A, the Risk Assessment Work Evaluation questionnaire and Form B, the Medical History questionnaire. Submit a signed copy of Form A to Environmental Health and Safety. Take or send completed forms A and B to Concentra Medical Center
- After approval is received from Concentra Medical Center, complete the orientation process with the vivarium staff.

After beginning work with research animals, you are required to:

- Complete annually the update questionnaire Form D (and/or Form E as required) provided by Environmental Health and Safety.
- Contact Concentra Medical Center at any time for a medical review and consultation if you
 - become injured,
 - feel you are developing an allergy,
 - are planning a pregnancy, or
 - you develop health concerns related to your research animal exposure.

Medical review includes:

- Review of applicable medical history
- Physical examination, if indicated, to include condition of skin (rashes or psoriasis)
- Discussion of risk factors associated with animal contact, including potential zoonotic agents, wound care, and potential hazards of field studies.
- Discussion of the health risk associated with compromised immune system (i.e., cancer, chemotherapy, radiation, steroid use, immunosuppressive drugs after organ transplant)
- Updating of tetanus-diphtheria immunization, as needed.

SECTION 3: POTENTIAL HAZARDS AND EXPOSURES WHEN WORKING WITH ANIMALS

PHYSICAL HAZARDS

HOUSEKEEPING AND SANITATION

Good housekeeping practices and sanitation is the key to reducing the risk of physical hazard injuries. It is important for you to keep work surfaces clean and clear of obstructions, waste, and other materials. All boxes, hoses, or bags of bedding material should be routinely removed from the work area. Mop floors and clean work surfaces with the appropriate cleaning and disinfectant solutions. Keep in mind that poor housekeeping is unprofessional and will increase your risk of accidents and injury.

BITES AND SCRATCHES

The hazard of animal bites and scratches is associated with animal and contaminated equipment contact and is best avoided by patient handling techniques and wearing appropriate personal protective equipment (PPE). Knowledge of animal behavior and how animals respond to their immediate physical environment is important in reducing risk of injury.

Animals respond to sights, sounds, and smells as people do, but they also hear, smell, and react to things that people do not detect. For example, if an animal hears a high-pitched sound, it may become frightened and react defensively. Many animals have a flight zone, and if approached by another animal or you as the handler, the affected animal may try to escape. Unsuccessful escape may cause the animal to act aggressively. Of course, inappropriate handling of an animal can cause discomfort, pain, and distress and provoke an animal to bite or scratch.

Animal bites and scratches that cause minor skin damage are sometimes disregarded by animal workers who are unfamiliar with a number of diseases that can be spread by such injuries. You should keep in mind that even minor bites and/or scratches can result in infections and illnesses if they are not properly treated.

Scratches, scrapes, and injuries from contaminated equipment associated with animal care and housing, such as cages, can be as great a risk as direct animal contact and should be addressed similarly.

The most important thing you can do to prevent infection following any bite, scratch, (or puncture from sharps exposure as discussed below) is to immediately and thoroughly wash the injury with soap and water. Inform your supervisor and record the injury in the bite and scratch log located in the animal facility. **Contact Concentra Medical Center for medical consultation or treatment.**

SHARPS

Another physical hazard is exposure to sharps. Sharps such as needles, broken glass, syringes, pipettes, and scalpels are all commonly found in animal facilities and laboratories. You should use extra care to avoid inadvertent contact and injury.

Needlestick injuries represent substantial risk for you to become infected especially when injecting animals with microbial agents or drawing blood. Your lab should have puncture-resistant and leak proof containers for disposal of sharps. To prevent needle sticks, it is critical that you always place used needles directly into the sharps container without recapping or any attempt to bend, shear, break, or remove the needle from the syringe.

LIFTING AND HANDLING HEAVY LOADS

Animal care operations involve a number of activities that can cause physical stress when handling and moving heavy loads. The use of proper lifting techniques can help prevent injuries to your back and shoulders when moving cages, bags of feed and bedding, pieces of equipment, and supplies. Poor physical fitness, obesity, poor posture, smoking, and medical/physical deficiencies are personal factors that may contribute to back pain. When lifting heavy loads, you should avoid sudden movements and use a two-handed lifting technique. Keep your back straight, feet positioned apart with one slightly ahead of the other, and knees bent as the lift is completed. Reduce loads where possible and get help when lifting awkward loads or those that cannot be handled safely by one person.

LYNX CAGE, RACK WASHER, & PASS-THROUGH AUTOCLAVE SAFETY PRECAUTIONS

Warning – Operator Burn Hazard

This washer operates at extremely high temperatures. Exposed utilities and piping can cause burns to the skin. The washer's inner and outer surfaces may also be extremely hot to the touch. Prior to any machine maintenance or service, the washer should be allowed to cool for sufficient time. Caution should always be used in and around the washer chamber and external piping. Water flow and discharge piping can cause personal injury such as burns. Operators should partially open the chamber door to allow hot air to exhaust and to allow all loads adequate time to cool before attempting to unload the unit.

Warning: opening the chamber door fully may cause large amounts of steam to escape.

Warning – Operator Slip/Fall Hazard

The areas located immediately around the washer may become slippery and cause a slip/fall hazard due to standing and dripping water. For a safe environment, ensure floor is kept clean and dry.

Warning – Operator Shock Hazard

Prior to any service or maintenance on the washer, all utilities should be turned off or disconnected and the proper lockout or tag-out procedures should be followed to insure safety and prevent accidental shock.

Warning – Personal Hazard and Equipment Damage

Safe and efficient operation requires scheduled preventative maintenance. For safety and proper equipment purposes, routine adjustments and replacement of parts should only be done by qualified maintenance personnel.

CHEMICAL HAZARDS

Those involved in the care and use of research animals must be familiar with the chemical hazards associated with the animal care and laboratory environment. Each chemical product should be handled carefully using the label directions, the recommended PPE, and in accordance with University guidelines and safety training. Safety Data Sheets (SDSs) are also available in the area on all chemical products used. These provide additional information on the hazards and precautions related to a chemical's use. Be certain that you understand the proper use of the chemical material before you use it.

BIOLOGICAL HAZARDS

Most animals used in research are bred specifically for that purpose and do not have the potential for transmitting the illness organisms that those in the wild do. But there are some illnesses and infections (zoonoses) that can be passed from animals to people, and these will be discussed in more detail later in this guide.

With research animals, biological hazards are of most concern when the animals are naturally infected or if animals are infected with a bacteria or virus as part of the experimental work. Under these conditions and when doing field research with wild species, it is of critical importance that appropriate personal protective equipment (PPE) and other appropriate protective measures be used to prevent infection.

ANIMAL BIOSAFETY LEVELS

If research animals are infected with bacteria or viruses as part of the experiments being done or are naturally infected, there must be consideration of what risk there is of exposure to people and, if there is a risk, how it will be controlled.

There are four levels of control, known as Animal Biosafety Levels (ABSL) 1 thru 4 that provide increasing levels of protection to those working with these animals. Each level has recommendations for practices, safety measures, and facility design that will control the particular level of biological hazard involved. ABSL1 is for animal work with little or no hazard to humans while ABSL4 are measures put in place to prevent exposure to highly infectious and life-threatening biological agents in the research animal.

In the animal facilities at Baylor University, there is no animal research done with highly infectious or exotic biological agents.

ANTIBIOTICS AND CONTROLLED SUBSTANCES

When using antibiotic materials, procedures should be adopted that minimize release of airborne materials and skin contamination. Of particular concern are releases of penicillin-type (or other) antibiotics during syringe-loading from multi-dose vials. Persons who have had previous exposures and have developed sensitivity can quickly go into anaphylactic shock after inhaling a mist of antibiotic material. Be sure to handle these materials with caution and according to use directions.

The Controlled Substances Act (Title II of the Comprehensive Drug Abuse Prevention and Control Act of 1970) places all substances regulated by Federal law into one of five schedules or categories based on the medicinal value and the potential for abuse. The Drug Enforcement Administration (DEA), part of the U.S. Department of Justice, has control and enforcement authority for controlled substances. Several of the drugs used for medical treatment, anesthesia, analgesia, and euthanasia are considered controlled substances. In order to legally purchase, use, dispense, and dispose of these drugs an appropriate license must be obtained from the DEA.

The PI of the laboratory will be responsible for all controlled drug use in the laboratory. The PI must maintain appropriate DEA licensing documents for the acquisition and use of controlled drugs. These documents are subject to inspection, at any time, by DEA agents or the Baylor IACUC.

Acquisition of controlled drugs requires having a DEA license number prior to ordering. Without the proper number, the vendor will not sell you the controlled drugs.

The laboratory must maintain a logbook of each quantity of controlled drugs that are:

- in possession and yet to be used
- in current use, or
- have been completely used and/or properly disposed.

Typically, the logbook maintains acquisition/purchasing records, use records that are detailed to indicate each withdrawal from the vial, the animal patient on which it was used, and the method/quantity that was disposed. This provides a legally defensible paper trail for the

controlled drug while it was in the responsible PI's possession. Without this logbook, there would be no record of the drug's proper vs. improper use.

The laboratory must use good practices when using and storing controlled drugs. For example, controlled drugs must always be secured by double locking mechanism when not in use. Drugs must not be left unattended on the counter-tops and/or lab benches. Dilutions of the stock drug concentration must also be secured and never left unattended. Controlled and non-controlled drugs must never be used after their expiration date. Expired drugs must be secured away from the regular drug inventory and not allowed to be put back into use while awaiting disposal. Periodic inspections by the Baylor IACUC specifically look for both expired and unsecured controlled drugs. Citation for this deficiency is easily prevented and impossible to defend to your administrative official.

The disposal of excess and/or expired controlled drugs must be coordinated with Baylor EHS. This should rarely occur since it is expected that the acquisition and subsequent storage of controlled drugs on campus is the minimum necessary to conduct the research project. Large quantities of these drugs are costly and have a higher potential to be either lost or stolen from the laboratory.

SECTION 4: ANIMAL AND LATEX ALLERGIES

ANIMAL ALLERGY

Allergic reaction to animals is among the most common condition that adversely affects worker health. The estimated prevalence of allergic symptoms among workers exposed to animals is from 10% to 40%. Workers who are continually exposed to animal allergens tend to have progressively more frequent and severe symptoms, and an estimated 10% develop asthma. Hence, it is critical that all workers seek to minimize their exposure to animal allergens. Additionally, once an animal allergy develops, the affected worker should minimize any additional allergen exposure to prevent progression of allergy symptoms.

Allergy is most often manifested by nasal symptoms (allergic rhinitis), itchy eyes (allergic conjunctivitis), and rashes (contact urticaria, atopy). Symptoms usually evolve over a period of 1-2 years and may lead to acute anaphylaxis in a small number of patients.

- In mice, sources of allergens include hair, dander, urine, and serum.
- In rats, sources of allergens include hair, dander, urine, serum, and saliva.
- In rabbits, are found in the fur and dander and to a lesser degree in the saliva and urine.
- In guinea pigs, urine is the main allergen with dander, fur, and saliva contributing.
- Exposure to birds can cause rhinitis and asthma symptoms. Multiple bird proteins have been identified as allergens and can be found in serum and fecal droppings that contain serum.
- Fish proteins can be an inhalation allergen for those who are sensitized.

Prudent efforts to prevent allergen exposure and reduce the frequency of sensitization in animal workers require strict work practices and consistent use of PPE. Housing animals in filter-top cages, working with animals in animal transfer stations or biological safety cabinets, working in well-ventilated areas, and using ventilated hoods for soiled bedding disposal will minimize exposure to animal allergens.

The work area must be maintained clean to prevent inhalant and contact exposure. Procedures should be adopted that minimize release of airborne materials, including bedding dust and antibiotic aerosols, and the contamination of hands, arms, body and face. Workers should adopt the use of PPE during each and every animal contact or allergen exposure. Wearing PPE "just some of the time" will not prevent exposure. Of particular importance is covering all exposed skin (i.e. gloves, lab coat, sleeve protectors) to prevent allergen contact.

It is also important that once animal procedures are complete, all contaminated PPE and clothing are removed and properly disposed of to prevent repeated exposure while performing subsequent duties. Contact your supervisor or EHS for further information and access to approved PPE devices.

LATEX GLOVES AND RELATED ALLERGIES

Allergic reactions to natural rubber latex have been increasing since 1987, when the Center for Disease Control recommended the use of universal precautions to protect against potentially infectious materials, bloodborne pathogens and HIV. Increased glove demand also resulted in higher levels of allergens due to changes in the manufacturing process. In addition to skin contact with the latex allergens, inhalation is another potential route of exposure. Latex proteins may be released into the air along with the powders used to lubricate the interior of the glove.

In June 1997, the National Institute of Occupational Safety and Health (NIOSH) issued an alert, "Preventing Allergic Reactions to Latex in the Workplace" (publication number DHHS (NIOSH) 97-135). NIOSH studies indicate that 8-12% of healthcare workers regularly exposed to latex are sensitized, compared to 1-6% of the general population. Latex exposure symptoms include skin rash and inflammation, respiratory irritation, asthma and shock. The amount of exposure needed to sensitize an individual to natural rubber latex is not known, but when exposures are reduced, sensitization decreases.

NIOSH recommends the following actions to reduce exposure to latex:

- If latex gloves must be used, choose reduced-protein, powder-free latex gloves.
- Whenever possible, substitute another glove material.
- Wash hands with mild soap and water after removing latex gloves

DECONTAMINATION PROCEDURES

Decontamination is a process or treatment that renders an instrument or environmental surface safe to handle. A decontamination procedure can be as simple as clean-up with detergent and water or as thorough as sterilization. Sterilization and disinfection are two ways to address microbial contamination.

Sterilization is the use of physical or chemical processes to destroy all microbial life, including highly resistant forms, such as bacterial spores.

Disinfection is the elimination of essentially all pathogenic non-sporeforming microorganisms, but not necessarily all microbial forms, from work surfaces and equipment. Effectiveness is influenced by a number of factors, including: types and numbers of organisms; amount of organic matter; the object being disinfected; the disinfectant being used; exposure time, temperature and concentration.

In Baylor University animal facilities, decontamination is accomplished by use of:

- disinfectants applied to surfaces and equipment;

- chemical sterilants and steam heat sterilization in an autoclave;
- the cage and rack washing machines located in the animal facility

You should be familiar with the safe and proper use of all chemical decontamination materials and equipment which you need to use as part of your animal lab responsibilities.

ANIMAL LABORATORY WASTE

Laboratory wastes unique to the animal facility include animal bedding and animal carcasses. These are generated along with the sharps and other biologically-contaminated equipment that typically need to be discarded in all laboratories.

- **Soiled animal bedding** is placed by the animal care staff in sturdy plastic bags, sealed, and transferred to carts for movement from the facility. Bags of soiled bedding should be limited to 40 pounds to prevent back and shoulder injury during subsequent handling. The animal care staff is responsible for movement of the bedding carts to the trash compactor located outside the building.
- **Animal carcasses** are bagged, sealed, and stored in freezers located in each animal facility until pick up by the vendor for disposal.
- **All sharps** are disposed of in provided sharps containers and, when full, placed in the red bag-lined medical waste box.
- **All other biologically-contaminated material** is placed in the red bag-lined medical waste box. When the medical waste box is full, it is the responsibility of the laboratory staff to seal the bag, seal the box, and apply a label completed with information about the generating lab.

[See Appendix B, Preventing Asthma in Animal Handlers](#)

SECTION 5: ZOONOSES

Zoonoses are diseases of animals that are transmissible to humans. They may be a significant exposure hazard in some laboratories where animals are used for research. Fortunately, many laboratory animal species today are bred to be free of zoonoses that were once more common in these animals. However, there remain zoonotic agents associated with laboratory animals, some which can be life-threatening. Field research with wild species also remains a clear source of zoonoses exposure. Prevention of exposure to these animal-related illnesses requires knowledge of the zoonoses related to the animals with which you will be working. In the sections that follow, the zoonotic agents listed for each animal species are those that may be present in the animals being used. If you are exposed through bite, scratch, aerosol droplet, mucosal secretion, feces or urine, there is the potential for you to become infected, and medical consultation through Concentra Medical Center is highly recommended.

MICE AND RATS

LABORATORY MICE:

Modern laboratory mice are bred to exclude all zoonotic agents. Unless the laboratory mice are exposed to wild mice (those coming from the natural habitat outside the laboratory), there is limited concern for disease from these research mice. However, there is always concern about secondary infections that can occur with bites and scratches. Common skin, intestinal, and soil bacteria present on you or the animal can infect the scratch or bite wound and cause these secondary infections. Therefore, you should handle all mice with care and always cleanse any wound immediately with soap and water or antiseptic and seek medical consultation for severe wounds.

WILD MICE:

Wild mice or laboratory mice that have been exposed to wild mice may have the potential of carrying a variety of zoonotic bacteria and viruses that can be passed on to those handling them. Because of the serious consequences of becoming infected, you must always follow good personal hygiene and animal handling procedures and use the provided PPE to protect yourself from exposure.

Mice that have originated from the wild or have had contact with wild mice could be infected with one or more of the illness agents described here:

Hantavirus

Hantavirus is transmitted through inhalation of dried rodent feces and urine when such material is raised into the air from disturbed bedding or nesting material. Transmission can also occur through rodent bites and contamination of broken skin or mucous membranes. The infection progresses from flu-like symptoms to respiratory complications and has resulted in death in over 50% of the cases, particularly when medical care was not quickly obtained. You can prevent exposure through the use of provided PPE, good personal hygiene, and wet, properly ventilated handling of waste bedding material.

Lymphocytic Choriomeningitis (LCM) Virus

LCM virus is transmitted to humans by inhalation, broken skin or mucous membrane exposure to blood, urine, feces, and other body secretions from infected mice. The infection results in flu-like symptoms 1 to 3 weeks after exposure. More severe symptoms of meningitis and encephalitis can result. There is a special risk of exposure during pregnancy because the fetus can become infected.

Because mice are provided from virus-free sources, the potential for exposure in Baylor University animal facilities is very limited. Again, use of proper PPE, such as disposable gloves and a lab coat along with careful hand washing will further reduce the likelihood of exposure.

RATS

Modern laboratory rats are bred to exclude all zoonotic agents. Therefore, unless the laboratory rats are exposed to wild rodents (those coming from the natural habitat outside the laboratory), there is limited concern for disease from these research rats. However, there is always concern about secondary infections that can occur with bites and scratches. Common skin, intestinal, and soil bacteria present on you or the animal can infect the scratch or bite wound and cause these secondary infections. Therefore, you should handle all rats with care and always cleanse any wound immediately with soap and water or antiseptic and seek medical consultation for severe wounds.

Historically, rats have been known to carry the bacteria that cause **Rat-Bite Fever**. However, these bacteria have not been found in laboratory rats for decades due to the special efforts of commercial suppliers to eliminate this bacterium from breeding colonies.

RABBITS, BIRDS AND FISH

RABBITS

Modern laboratory rabbits contain few infectious pathogens. Of concern are scratches that can be inflicted with their strong hind legs and sharp claws or from bites. Secondary infection with common skin, intestinal, and soil bacteria present on you or the animal can result, so always

cleanse wounds immediately with soap and water or antiseptic and seek medical consultation for severe wounds.

Historically, laboratory rabbits have been known to harbor the bacteria for human **Tularemia (Rabbit Fever)**. Although this zoonotic agent remains present in wild rabbit populations, modern laboratory rabbits are free of this illness bacterium.

BIRDS

The birds used in research colonies are either caught in the wild or acquired from established flocks. In general, birds are not supplied disease-free, and usually contain a number of microbial agents. Of zoonotic concern are the diarrheal bacteria, such as *Salmonella* that cause intestinal illness and the bacteria that causes psittacosis, which can cause a more severe type of infection.

Salmonella

Salmonella bacteria is a common contaminate of fecal droppings and eggs. When ingested by humans, this bacterium has the potential for causing severe intestinal disease. Use of good personal hygiene measures, including effective and thorough hand washing along with the proper PPE, such as disposable gloves and lab coat, will greatly reduce the likelihood of infection when handling birds and materials in their environment.

Psittacosis

The bacteria *Chlamydophilaia psittaci* is the cause of psittacosis, and it is found most widely in large, imported psittacine birds (i.e. parrots, parakeets, cockatoos, macaws). Human infection is most often the result of exposure to these imported birds. The risk of exposure from domestic birds is very low. However, because this bacterium is highly infectious, there is some potential that any bird or mammal may be infected. Acute infection in animals causes such symptoms as reddening of the eyes (conjunctivitis), difficulty breathing (pneumonia), swollen painful joints (arthritis), and reproductive problems. After the acute infection, those animals that survive enter a period without symptoms during which stress can cause the animal to shed the bacteria. Stress can result from such things as the importation process or birds being handled in their new environment. Humans can be infected when coming in contact with the bird's bodily secretions, or feces. In humans, the symptoms include fever, headache, muscle pain, chills. If left untreated, the infection may cause pneumonia, liver, heart, and brain inflammation.

USDA regulations require that testing be performed on all psittacine birds imported from foreign countries during an initial 60-day quarantine period. Such birds are to be quarantined in specially ventilated rooms while testing is done and infected birds require elimination from the colony. If you are handling birds, use of protective apparel and thorough hand washing will reduce the risk of any potential exposure.

Fish and amphibians used in research colonies are mostly wild-caught or raised on commercial farms. These animals often contain parasites and bacteria. Of zoonotic concern are gram negative bacteria that will cause secondary infection of contaminated wounds and breaks in the skin. These bacteria include *Aeromonas*, *Pseudomonas*, *Klebsiella*, and *Mycobacteria*. Use of proper PPE, such as disposable gloves, will help prevent contamination of skin surfaces. Likewise, thorough hand washing is very important to further reduce potential for infection.

BATS

BATS

Exposure to wild bat roosts and handling of bats in the field presents a greater potential for exposure to rabies and the fungal disease *histoplasmosis*. Because the wild bats may have a greater potential to carry **rabies virus** or generate *histoplasmosis* spores in fecal-contaminated soil, there is greater need for care in handling of the animals and in disturbing and cleaning of fecal-contaminated roosts.

Bat bites and scratches and wound and mucous membrane exposure to bat saliva are the ways in which rabies can be transmitted. Spores of *histoplasmosis* can be present in soil and debris enriched with bird and bat droppings. When this dry soil is disturbed, spores can become airborne and cause infection by inhalation. In enclosed spaces where these conditions are present, it is important that protective clothing and a dust mask be worn and that potentially-contaminated soil and debris that will be disturbed be moistened with water spray to control dust dispersion.

Rabies

Rabies is a preventable viral disease that causes an inflammation of the brain, and is almost always fatal once symptoms develop. Rabies is transmitted through the saliva of infected, warm-blooded animals. Worldwide, dogs are the most common source of rabies. In the United States, skunks, raccoons, foxes, coyotes, and bats are the main source of rabies infections. Most people who get rabies have been bitten by an infected animal, but getting the infected saliva from an infected animal into an open wound or mucous membrane of the eyes, nose, or mouth can also lead to infection. Rabies is not spread by contact with bat feces, blood, or urine.

Rabies virus infects the central nervous system, causing brain inflammation and ultimately death. Early symptoms of rabies in humans are nonspecific, consisting of fever, headache, and general malaise. As the disease progresses, neurological symptoms appear and may include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucinations, agitation, hypersalivation, and difficulty swallowing. Death usually occurs within days of the onset of symptoms.

Rabies can be prevented by avoiding contact with infected animals, and providing pre-exposure and/or post-exposure vaccination to those who have high-risk contact with animals presumed to be infected.

Post-exposure treatment should begin as soon as possible after exposure. It begins with a dose of rabies immune globulin given partially in the wound, if possible, and partially in the deltoid shoulder muscle. This is followed by a series of 5 vaccination injections given over 28 days.

A pre-exposure vaccine regimen consisting of 3 inoculations over 28 days is required for those working with laboratory bats. **Completing the pre-exposure vaccine series does not eliminate the need for post-exposure treatment; it only reduces the post-exposure regimen.**

In the event of a bat bite or mucous membrane exposure to bat saliva, it is critical that the following be done:

- Immediately wash the wound thoroughly with soap and water. Flush exposed mucous membranes of the eyes, nose, or mouth for 15 minutes at an eye wash station, sink drench hose, or hose from a potable water source.
- Proceed to Concentra Medical Center for medical evaluation and appropriate post-exposure treatment.

Histoplasmosis

Histoplasmosis is a disease caused by the fungus *Histoplasma capsulatum*. The histoplasmosis fungus lives in soil, especially soil and material that is contaminated with and enriched by heavy accumulations of bat or bird droppings. Spores become airborne when contaminated soil is disturbed. Breathing the spores causes infection. The disease is not transmitted from an infected person to someone else.

Infection with histoplasmosis is common, but the disease is rare. Most infected persons have no apparent ill effects and infection clears on its own without treatment. As many as 80 percent of persons living in U.S. areas where the fungus is common have a positive skin test, meaning they have had the infection in the past. However, most of these people do not have a history of histoplasmosis symptoms. When people develop symptoms, it usually involves the lungs and is characterized by weakness, chills, fever, muscle aches, chest pains, and a dry cough. Chronic lung infections can resemble tuberculosis and may progress over months or years.

Infection can be prevented by using the following precautionary measures:

Before disturbing potentially-contaminated soil or debris, thoroughly mist-spray the material to control dispersion of dust and soil into the air. Wear protective, disposable coveralls, gloves and a dust mask.

Field studies involving wild animal populations can expose workers to a number of additional zoonoses that may be naturally endemic in some wild species. For those doing field studies involving birds, mice, and other wild species, more careful consideration needs to be given to conscientious use of PPE, good personal hygiene, i.e. hand washing, and appropriate training and application of good animal-handling techniques to minimize exposure to infection or injury.

SECTION 6: BEST PRACTICES WHEN WORKING WITH RESEARCH ANIMALS

BEST PRACTICES TO PREVENT ILLNESS EXPOSURE WHEN WORKING WITH RESEARCH ANIMALS:

- The most important thing you can do to prevent infection following any bite, scratch, or puncture from sharps exposure is to immediately and thoroughly wash the injury with soap and water.
- Avoid the use of sharps whenever possible. Take extreme care when using a needle and syringe to inject research animals or when using sharps during necropsy procedures. **Never remove, recap, bend, break, or clip used needles from disposable syringes.**
- Keep hands away from mouth, nose, and eyes.
- Wear the required PPE in all areas within the animal facility.
- Remove gloves and wash hands after handling animals or tissues derived from them and before leaving areas where animals are kept.
- Use mechanical pipetting devices (no mouth pipetting!).
- Never eat, drink, smoke, handle contact lenses, apply cosmetics, or take or apply medicine in areas where research animals are kept.
- Perform procedures carefully to reduce the possibility of creating splashes or aerosols.
- Contain operations that generate hazardous aerosols in biological safety cabinets or other ventilated enclosures, such as animal bedding dump stations.
- Wear eye protection.
- Keep doors closed to rooms where research animals are kept.
- Promptly decontaminate work surfaces when procedures are completed and after surfaces are soiled by spills of animal material or waste.
- Properly dispose of animal waste and bedding.

APPENDIX A: PERSONAL PROTECTIVE EQUIPMENT

INTRODUCTION

Personal protective equipment (PPE) includes all types of equipment used to increase individual safety while performing potentially hazardous tasks. This may include safety glasses, gloves, lab coats, respirators, or any equipment used to protect against injury or illness.

SCOPE AND APPLICATION

The Occupational Safety and Health Administration (OSHA) requires PPE to be provided, used, and maintained in a sanitary and reliable condition wherever hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants are encountered in a manner capable of causing injury or illness through absorption, inhalation, or physical contact. Departments are responsible for ensuring the adequacy of the equipment and ensuring that it is properly maintained, even in those cases where employees provide their own PPE.

PROGRAM DESCRIPTION

Engineering controls that eliminate the hazard at the source, and do not rely on the worker's behavior for their effectiveness, offer the best and most reliable means of protection. Therefore, engineering controls are the first choice for eliminating workplace hazards. Whenever engineering controls are not available or are not fully capable of providing protection, the worker must wear personal protective equipment.

Hazard Assessment and Equipment Selection

Departments must assess their workplaces to identify hazards requiring the use of PPE. Equipment should be selected to provide protection against the hazards identified during the assessment. The hazard assessment must be documented in writing.

Eye and Face Protection

Appropriate eye and face protection, such as safety glasses, goggles, and face shields, must be used to protect against the hazards associated with flying particles, molten metal, liquid chemicals, acids and caustic liquids, chemical gases and vapors, or potentially injurious light radiation.

Hand Protection

Hand protection must be worn to protect against hazards of skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns, or harmful temperature extremes.

Respiratory Protection

Respiratory protection may be used to protect against inhalation hazards when engineering and administrative controls are not feasible or adequate.

Training

Each worker required to use PPE must receive training in the following:

- how to properly wear PPE
- what types of PPE provide protection against the hazards identified during the assessment
- when PPE must be used
- the proper care and useful life of PPE
- proper disposal of damaged PPE

The department must document in writing that workers have received and understood this training.

WARNING! Exposure to animals or animal products in the workplace can cause asthma and allergies.

Animal handlers should take steps to protect themselves from exposure to animals and animal products:

- Perform animal manipulations within ventilated hoods or safety cabinets when possible.
- Avoid wearing street clothes while working with animals.
- Leave work clothes at the workplace to avoid potential exposure problems for family members.
- Keep cages and animal areas clean.
- Reduce skin contact with animal products such as dander, serum, and urine by using gloves, lab coats, and approved particulate respirators with face shields.

Employers of animal handlers should take steps to protect workers from exposure to animals and animal products:

- Modify ventilation and filtration systems:
 - Increase the ventilation rate and humidity in the animal-housing areas.
 - Ventilate animal-housing and -handling areas separately from the rest of the facility.
 - Direct airflow away from workers and toward the backs of the animal cages.
 - Install ventilated animal cage racks or filter-top animal cages.
- Decrease animal density (number of animals per cubic meter of room volume).
- Keep cages and animal areas clean.
- Use absorbent pads for bedding. If these are not available, use corncob bedding instead of sawdust bedding.
- Use an animal species or sex that is known to be less allergenic than others.
- Provide protective equipment for animal handlers: gloves, lab coats, and approved particulate respirators with face shields.
- Provide training to educate workers about animal allergies and steps for risk reduction.
- Provide health monitoring and appropriate counseling and medical follow-up for workers who have become sensitized or have developed allergy symptoms.

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing asthma and allergies in animal handlers. Approximately 2 million workers have jobs that require constant contact with animals or animal products [Brooks 1992]. About 33% of animal handlers have allergic symptoms, and approximately 10% have symptoms of animal-induced asthma [Chan-Yeung and Malo 1994]. Animals or animal products such as dander, hair, scales, fur, saliva, and body wastes contain powerful allergens that can cause both respiratory and skin disorders. Workers at risk include laboratory animal and veterinary technicians, researchers, veterinarians, and others who have prolonged, close association with animals or

their secretions or excretions. Also at risk are workers who handle animal products or associated materials such as bedding and feed.

This Alert describes three case reports of workers affected by exposures to animals. The recommendations presented here can help reduce such exposures and prevent animal-induced asthma and allergies.

BACKGROUND

Animal-related asthma and allergies are exaggerated reactions of the body's immune system to animal proteins, also known as allergens. Sources of these allergens include animal dander, scales, fur, body wastes, and saliva [Bardana 1992; Lincoln et al. 1974].

Inhalation is one of the most common ways for allergens to enter the body. After a period of time (often several months, but occasionally many years), workers may inhale sufficient quantities of allergens to become sensitized that is, they develop symptoms when exposed again, even to tiny amounts of the allergen [Bardana 1992; Chan-Yeung and Malo 1994]. Airborne exposures to dusts derived from animals are not currently regulated to protect workers from developing allergic problems.

The diagnosis of animal allergy or sensitization is made using skin-prick tests, blood antibody tests, and other methods. Symptoms vary among workers who have become sensitized to animals. Mild reactions include sneezing and runny nose. More serious reactions to an inhaled allergen may result in asthma symptoms such as cough, chest tightness, wheezing, or shortness of breath. In sensitized workers, reactions often occur soon after exposure to the animal or animal product, but they may be delayed for 2 to 8 hours or more.

A worker who has developed asthma symptoms from animal allergies often improves or recovers completely if he or she immediately stops being exposed to dusts containing the animal allergens. However, the longer the exposures continue, the more likely the illness will persist, even after all contact with animals has stopped.

Symptoms from animal-related asthma and allergies can be severe and may require affected workers to change jobs or careers [Bardana 1992]. Affected workers and their employers must bear the costs for treatment, time lost from work, and temporary or even permanent disability [Newill et al. 1986].

COMMON SOURCES OF EXPOSURE

Sources of exposure to animal allergens vary with animal species. For example, the most important allergens have been found in the urine of rats and in the urine, saliva, and pelts of guinea pigs [Chan-Yeung and Malo 1994]. Rat urine contains significant amounts of a protein

that is also found in dust samples from ventilation systems of animal facilities [Bardana 1992]. Other important sources of allergen exposure include rabbit pelts, cat saliva and dander, dog dander, and horse serum and dander [Bardana 1992].

Exposures to rats, mice, and rabbits have frequently been associated with the development of occupational asthma. Species other than mammals have also been reported to cause respiratory symptoms of various insects, for example, and frogs (which are commonly used in science classes) [Bardana 1992]. Exposures to birds have been associated with other respiratory diseases, including hypersensitivity pneumonitis [Parker et al. 1992]. A person who becomes allergic to one animal species may react to other species as well. Even a low exposure to these common sources of animal allergens can result in allergies, but the risk increases as the worker's exposure increases [Hollander et al. 1997].

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