

**OCCUPATIONAL HEALTH & SAFETY
FOR MSU PERSONNEL IN
CONTACT WITH VETEBRATE
ANIMALS**



**OCCUPATIONAL HEALTH AND SAFETY
FOR LABORATORY ANIMAL FACILITY
EMPLOYEES AND USERS**

TABLE OF CONTENTS

Introduction.....	1
Enrollment and Procedures.....	1
Safety Principles	2
Personal Hygiene	3
Special Susceptibilities	4
University Hazard Oversight Committees.....	4
Specific Hazardous Agents or Circumstances.....	5
Types of Hazards	5
Hazard Containment.....	7
Emergencies	8
Animal Bite And/Or Scratch Procedure	8
Allergies to Laboratory Animals.....	8
Physical Hazards.....	9
Chemical Hazards	10
Handling Compressed Gases.....	12
Biohazards Associated with Types of Animals.....	13
Transmission of Diseases.....	15
Conclusions	16

OCCUPATIONAL HEALTH AND SAFETY INFORMATION FOR MSU PERSONNEL IN CONTACT WITH VERTEBRATE ANIMALS

INTRODUCTION

Because there are hazards and risks associated with the care and use of animals, the Occupational Health and Safety Program (OHSP) is an important component of Mississippi State University's institutional animal care and use program. The purpose of this program is to ensure the occupational health and safety of institutional employees, visitors, and students who in the course of their work with research animals might be exposed to hazards that could adversely affect their health and safety. This program is supported by the campus-wide occupational health and safety program. This program is designed to protect both MSU's personnel and the animals.

An effective OSHP requires coordination between the researchers/animal caretakers, the Institutional Animal Care and Use Committee (IACUC), the University Laboratory Animal Veterinarian (ULAV), the Institutional Official (IO/Vice President for Research and Economic Development), the Office of Environmental Health and Safety (EHS), the Longest Student Health Center (LSHC), and the Office of Research Compliance (ORC).

ENROLLMENT PROCEDURES

All personnel working with or around vertebrate animals at MSU are required to enroll in the OHSP at the website given below. Once basic information (name, contact information, physician) is provided, the user may then choose to provide medical information for assessment by a physician.

Information is available at: <http://www.health.msstate.edu/database/vet/>

Steps

1. If the user is a new employee, the Occupational Health Evaluation forms on line must be completed before acquiring animal related duties. See instructions: <http://orc.msstate.edu/animalcare/iacuc/docs/ohspinstructions.pdf>
2. Existing employees should update this information when one of the following occurs:
 - a. your MSU work assignment changes.
 - b. your personal health status changes.
 - c. your environmental risk conditions change.
 - d. the species you work with changes.

Failure to enroll and/or provide updates may result in suspension of your ability to work on an animal protocol or in an animal facility. If you have questions about the process, please contact the Office of Research Compliance at 662-325-0994.

LSHC medical personnel will review the health evaluations in conjunction with the risk assessment and make recommendations to the individual. At no time will the medical information be shared with anyone outside the Longest Student Health Center. This medical information is private and will be maintained confidentially.

SAFETY PRINCIPLES

Personnel safety is an important objective of Mississippi State University. Safety is promoted and achieved through good facilities and equipment, the establishment and enforcement of safety rules, informed and trained personnel, and the use of appropriate protective clothing and equipment. General principles:

1. Knowing that traumatic injury firstly, and allergic reactions secondly are the most common hazards
2. Assuming responsibility for your safety and for observing the safety practices of others
3. Minimizing risks
4. Reading and obeying posted signs and information
5. Asking questions, if you are not sure
6. Not hurrying risky procedures
7. Using common sense at all times

As a rule, the incidence of zoonoses (i.e., diseases of animals transmissible to man) is low among personnel handling or using laboratory animals and a long listing of those diseases produces a distorted impression of actual risks involved. Some of the more common and serious diseases are described later in this document. In general, health and safety matters are related to facility and equipment design, the species you work with, the frequency and type of contact, and your own health status.

Routine cautions:

1. Floors, walls, sinks, and all fixed equipment should be kept clean and uncluttered.
2. Movable equipment should be placed, stabilized, stored, and operated properly.
3. When pests (insects, wild rodents) are noted, notify the supervisor. He/she will arrange for the pest exterminator to rid the area of pests. The unauthorized use of pesticides can be hazardous to personnel and disruptive to research.
4. Wash hands with disinfectant (preferably) soap when leaving an animal room or, if the building is served by a common sink, when leaving the building.
5. In animal facilities, use only the antiseptics, disinfectants, and detergents selected by the supervisor and used precisely as directed. If used improperly, these chemicals can be ineffective, wasteful, and even hazardous. Fumigants, experimental chemicals, and compressed gases may be dangerous also. Additional information is available at: <http://www.ehs.msstate.edu/safety/chemical/storage/>

6. Seal animal carcasses, waste bedding, and other biological wastes carefully in double plastic bags or in a barrel, and label and place in an assigned, refrigerated storage area. Additional information is available at:
<http://www.ehs.msstate.edu/safety/biological/library/pdfs/wastemanagement.pdf>
7. Dispose of syringes, needles, and other “sharps” in containers provided for that purpose. Do not allow containers to become overfilled. Additional information is available at:
<http://www.ehs.msstate.edu/safety/biological/library/pdfs/sharps.pdf>
8. Wear protective clothing and use animal restraint techniques and equipment as instructed by a supervisor.
9. Report all bites, scratches, kicks, or injuries, inflicted by an animal or object. The First Report of Injury or Illness Form must be completed under the provision of the Worker’s Compensation Act (available at <http://www.hrm.msstate.edu/benefits/insurance/workerscomp/>) within 24 hours of accident.
10. Clean and clear the work area. Sufficient aisle space among cage racks and work tables must be allowed.
11. Do not smoke, eat, drink, apply cosmetics, insert or remove contact lenses or use tobacco products in animal use or housing areas.
12. Set damaged or defective cages and racks aside and notify a supervisor so the equipment can be repaired.
13. Do not overload carts, obscure vision, or add excess weight to transport carriers.
14. Use the correct transport carrier for the job. Non-nesting objects stacked in tiers can slide under impact and must be held in place by vertical or horizontal supports.
15. Sweep (never pick up) broken glassware with a brush and dustpan. Do not pick up glass with fingers.
16. Avoid animal species that you have not been taught to handle.
17. Master proper methods for lifting. Do not lift heavy or awkward objects without instruction or assistance. Additional information is available at:
<http://www.ehs.msstate.edu/riskmanagement/addresources/lifting/>
18. Take care when walking on slippery or irregular floors. Additional information is available at: <http://www.ehs.msstate.edu/riskmanagement/addresources/falls/>

PERSONAL HYGIENE

1. Animal care and use personnel should wear a full length uniform or lab coat and, as

appropriate, a face mask, gloves, and head or hair cover in animal holding rooms. These should not be worn in public areas and never taken home.

2. Whenever bare hands, arms, neck/face, or head become accidentally or unavoidably contaminated with animal blood, urine, feces, or hair, such contamination should be removed as soon as possible by washing thoroughly with water and soap. When materials enter the mouth or eyes, wash the exposed area with generous amounts of water.
3. In some circumstances, a shower should be taken when entering the facility at the beginning of the workday and when leaving at the end of the day.
4. Special containment rooms, designed for projects involving known hazardous agents, are available. Environmental Health & Safety should be contacted.
5. Projects involving hazardous agents or materials have very strict requirements for clothing and procedures. Containment procedures are for the protection of personnel and other animals. Specific standard hazard signs operating procedures should be posted. Signs no longer relevant must be removed.

SPECIAL SUSCEPTIBILITIES

Persons who are or are planning to become pregnant, are immunocompromized for any reason (AIDS, chemotherapy, steroid use, chronic disease), have neuromuscular or musculoskeletal problems, have diabetes, are missing a spleen, or have other illness that may place them at extra risk should contact their physician before using animals.

UNIVERSITY HAZARD OVERSIGHT COMMITTEES

Institutional Biosafety Committee

The Biological Safety Program at Mississippi State University provides guidance for faculty, staff and students who work with biohazardous materials. The goal is to maintain a safe and healthy work environment with emphasis on regulatory compliance with Occupational Safety and Health Administration (OSHA), the Centers for Disease Control and Prevention (CDC), the National Institutes of Health (NIH), and the U.S. Department of Agriculture (USDA).

The University Biosafety Officer, a member of the office of Environmental Health & Safety, works closely with the Institutional Biosafety Committee and MSU personnel to ensure that the appropriate biosafety programs are in compliance with applicable regulations and have the desired protective effects.

The purpose of the Institutional Biosafety Committee(IBC) is to ensure protection of workers who generate, process, and dispose of potentially hazardous biological materials at Mississippi State University, as well as others who may become exposed to biological hazards within the university environment. This oversight is also intended to ensure the welfare and safety of the surrounding community and environment.

The IBC is a standing committee that reports to the Vice President for Research and Economic Development. It has the responsibility under the NIH Guidelines and on behalf of the University for formulating and recommending biosafety policies and establishing procedures, as well as reviewing research involving matters relating to biosafety for compliance and approving projects judged to be compliant.

The University has further charged the IBC with responsibility for (a) oversight and establishment of procedures and policies regarding disposal of non-radioactive biohazardous wastes, (b) reviewing and advising with regard to situations which represent potential biological hazards, and (c) reviewing research personnel, facilities, procedures, and proposals in the area of recombinant DNA technology.

Radiological, Chemical, and Laboratory Safety Committee

The Radiological, Chemical, and Laboratory Safety (RCLS) Committee oversees MSU's broad scope license for the use of radioactive materials with atomic numbers 1-99. The RCLS Committee and the Radiation Safety Officer provides for effective, efficient, and safe policies and procedures for main campus procurement, use, storage, and disposal of all radioactive materials and equipment that are sources of ionizing radiation.

SPECIFIC HAZARDOUS AGENTS OR CIRCUMSTANCES

Research may involve the use of materials or procedures that present a biological, chemical, radiological, or physical hazard to staff and/or laboratory animals. Only trained, qualified personnel should handle contaminated animals. A complete understanding of potential problems and precautions should be documented to the appropriate safety officer and the IACUC before any research involving hazards in animals is initiated.

Proper biohazard signs (see sample signs in this booklet) and notices must be posted in appropriate places throughout the facility. Contaminated animals or animal wastes must be disposed of in areas bearing a hazard sign or symbol. Detailed procedures should be developed so that all personnel involved understand the potential dangers and precautions before a project involving a known hazard is initiated.

Types of Hazards

Physical Agents: Sharp objects, slippery floors, broken or weak supports, heavy weights, ultrasound, and many other conditions pose a physical hazard.

Radiation: Occupational exposure to radiation on the MSU campus may occur via the use of radionuclides (both sealed and unsealed sources) or the use of x-ray emitting devices. Radioactive forms of elements, radioisotopes, are commonly used as tracers in biological investigations of metabolic processes, for instance. Use of any radioactive material requires prior approval from the University Radiation, Chemical, and Laboratory Safety Committee (RCLS) to ensure the use is consistent with the University's radioactive materials license. This license, issued by the Mississippi State Department of Health, Division of Radiological Health, governs

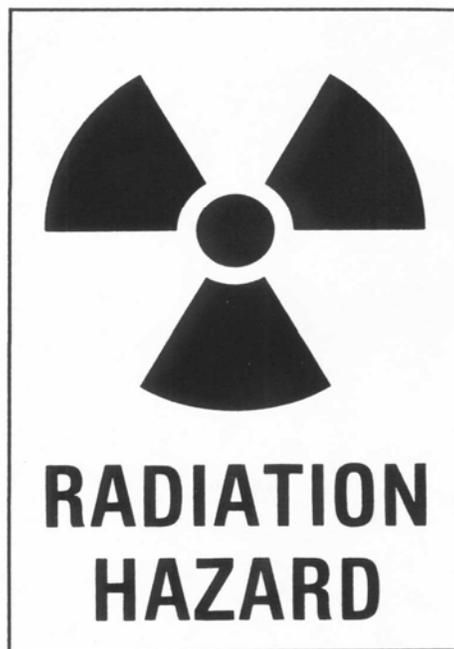
use of radioactive material on campus. Approval of research involving radionuclides or x-ray producing devices will require adherence to stringent safety and security procedures and may require the user(s) to wear radiation dosimeter(s). Any research involving radionuclides or x-ray producing devices must be initiated by contacting the Office of EHS. Contact EHS at 325-3294 for assistance if your proposed work involves radionuclides or x-ray emitting devices.

Pathogens: Pathogens are live infectious bacteria, viruses, fungi, or parasites that pose a threat to humans and animals. Some pathogens and their diseases are, for example, tuberculosis in monkeys, cryptosporidiosis in cattle, or Q-fever in sheep. Many pathogens are blood-borne. Other pathogens are utilized as a component of some research studies. In all cases, standard safeguards and procedures should be developed by the facility management to protect technical staff and investigators. The Biosafety Officer may be contacted at 325-0620 or 325-3294.

Mutagens, Teratogens, and Carcinogens: Mutagens are substances that cause changes in chromosomes and thereby induce the occurrence of mutations. Examples of such substances are high doses of X-rays and some chemicals. Teratogens affect the embryo or fetus. Carcinogens are substances that can produce cancer directly. The Chemical Hygiene Officer may be contacted at 325-8543 or 325-3294.

Toxins and Chemicals: Toxins are poisonous substances produced by bacterial, plant, or animal cells. Some bacteria, for example, produce toxins (e.g., tetanus), and castor bean plants produce a toxin called ricin. Assistance in the safe use, handling, and storage of these materials may be obtained from EHS at 5-3294.

The Biological Safety Officer may be contacted at 325-0620 or 325-3294.



Hazard Containment

Exposure to potentially hazardous biological, chemical, radiological, or physical agents should be monitored. Protective devices should be used when possible, and other safety practices consistent with current safety guidelines should be adopted. Potentially hazardous chemicals in the animal laboratory or care room may be found in disinfectants, cleaning agents, or pesticides, and as feed and bedding contaminants.

Hands should be washed after removing gloves, handling chemicals, infectious materials, animals, and before leaving the laboratory. A certified biological safety cabinet and gloves should be used when handling infectious materials and a certified fume hood used when handling toxic materials. Additional information is available at: <http://www.ehs.msstate.edu/safety/laboratory/hoods/>. All work surfaces--after use and daily--should be decontaminated. All contaminated materials should be decontaminated (by autoclaving or chemical disinfection) before washing, reuse, or disposal. The decontamination procedure will vary with the agent.

Laboratory animal facilities use the following methods to contain hazards:

1. Air pressure differences that result in positive and negative pressure zones, with air flow from “clean” to “dirty.”
2. Use of special hazard containment units (isolators) or cages.
3. Filtration of exhaust air from laboratories, animal rooms, and ventilated cabinets.
4. Airlocks and pass-through autoclaves located between clean and contaminated areas.
5. Ultraviolet light barriers at doorways, airlocks, and in special laboratory areas destroy organisms on surfaces.
6. Sinks with running water, soap and towels, and, sometimes, change and shower rooms.
7. Intercom systems between clean and biohazardous areas.
8. Provisions for treatment of contaminated sewage from laboratory drains and animal cages.
9. Approved back-flow check valves in the main water supply lines.
10. Physical and traffic flow separation between hazard containment areas and utility systems such as air supplies, compressed gases, steam supplies, central vacuums, laboratory drains, sanitary sewers, and water.
11. A detailed standard operating procedure for each specific hazardous study, whose rules are followed carefully by animal technicians and investigators.

EMERGENCIES

If a person is severely injured or found unresponsive, :

1. Call 911, and report where the injured person is located and give the person's name.
2. Describe extent of the injury or illness.
3. After the injured employee has received medical attention, the supervisor should complete the First Report of Injury or Illness Form and submit it to Human Resources Management for processing.

If a person receives a non-life-threatening-injury, he/she should inform his or her supervisor of the injury as soon as possible after initial first aid is completed. The supervisor should complete the First Report of Injury or Illness Form and submit it to Human Resources Management for processing.

ANIMAL BITE AND/OR SCRATCH PROCEDURE

All bite or scratch wounds that result in bleeding should be scrubbed and cleansed immediately and thoroughly with soap and water. Injuries sustained from a cat or dog should be washed for 15 minutes. First aid kits are available in the area. All bite and scratch wounds should be observed closely. If redness, pain, or swelling occurs around the wound, a physician should be consulted. A tetanus immunization should be current (within 10 years). If the employee's tetanus vaccination program is not current, he or she should receive a tetanus immunization. Bite incidents may require that the animal be quarantined, especially if the animal's vaccination history is unknown.

ALLERGIES TO LABORATORY ANIMALS

Allergies to laboratory animals are a common and important occupational health problem for persons who care for or work with animals.

Laboratory animals involved: Probably any species can be allergenic. Species most commonly implicated in allergies (percent of total incidents) are rat, rabbit, guinea pig, mouse, cat; dog, and hamster.

Disease in man: Surveys show that allergies occur in 11 to 30 percent of people who have direct contact with animals and occur within 2 years of the first exposure, but the majority of affected individuals develop the symptoms within 6 months of exposure. A previous history of other allergies, such as hay fever, may indicate a greater tendency to develop allergies, but this was not evident in all surveys. Evidence suggests that a history of previous allergies is correlated with the likelihood of severe symptoms (asthma) in individuals who have allergies. Surveys indicate also that more than half the individuals who become allergic to laboratory animals may require treatment or have to stop working, at least for a temporary period.

Signs of allergies may manifest initially as watery eyes, nasal discharge, sneezing, and coughing, and may, on repeated exposure to airborne allergens, progress to more serious lower respiratory

symptoms, such as asthma. Asthma symptoms usually occur shortly after contact, but they may not occur until hours later when the allergic individual has gone home.

Direct skin contact when handling animals may result in wheals, urticaria, and more chronic symptoms such as eczema. Bites and scratches must be avoided.

The animal allergens can originate from shed dander and hair, or can be contained in urine, saliva, serum, or tissues. Animal allergens are specific proteins of low molecular weight (17,000-67,000 mwt). Several allergens have been isolated and characterized: mouse albumin, mouse dander allergen, rat urinary protein, cat allergen 1, cat serum albumin, dog serum albumin, and cow dander allergen. Immunologic tests indicate that each of these is a unique, highly specific allergen with little cross-reactivity.

Diagnosis, control, and prevention: Diagnosis of allergies is based on a detailed history, a physical examination, and a variety of tests.

Symptomatic relief can be obtained under the care of a physician, with careful use of drugs and desensitization procedures.

Avoiding allergens completely may be the best way to control laboratory animal allergies. For these individuals a variety of practices can help reduce contact with the offending allergens. These include the use of masks and other protective clothing, housing animals in filter-top cages, and the use of other filtered and ventilated caging systems, improving ventilation, avoiding recirculation of animal room air, increasing the frequency of cage cleaning, and reporting problems promptly to a supervisor or physician.

PHYSICAL HAZARDS

Most of the health problems occurring in an animal facility involve accidents unrelated directly to animals. These problems are very common, and are prevented by knowledge of dangers, proper cautions, and appropriate signage.

The most common situations that may cause injury are:

1. Falling on slippery floors or from weak or broken supports
2. Lifting items improperly
3. Falling over uneven surfaces
4. Cuts from needles, knives, wires, and other sharp instruments or implements
5. Injuries from operating heavy equipment
6. Burns from flammable or heated materials or steam
7. Exposure to toxic substances, such as anesthetic gases, pesticides, and experimental substances

8. Getting particulate matter in eyes and respiratory tract
9. Excessive noise

CHEMICAL HAZARDS

General guidelines for handling chemicals:

1. Store chemicals in a cool, central area.
2. Store volatile chemicals in a special cabinet and prevent vapors from collecting and creating a hazard.
3. Dispense cleaning chemicals to people who have been instructed in their use.
4. Follow instructions on the label. Higher use levels are rarely more effective and will probably be hazardous.
5. NEVER use the contents of an unlabeled container. Do not assume you know what is in the container -- it is cheaper to waste the contents than to make a mistake.
6. NEVER mix different chemicals unless the manufacturer or a knowledgeable person authorizes you to do so: Combinations can be ineffective or hazardous. Combining bleach and ammonia, for example, creates noxious fumes.
7. DO NOT REUSE empty containers for a different product. Rinse the container and discard it properly.
8. If chemicals are purchased in bulk containers and must be dispensed into smaller quantities, dispense the chemicals into smaller containers of the same quality as the original containers and that have not been used for storage of another product. All such containers should be labeled permanently.

Specific guidelines for handling chemicals:

1. Paraformaldehyde
 - a. This chemical is used in accordance with fumigation guidelines to fumigate rooms in which infectious agents have been used
 - b. Paraformaldehyde and the gas formaldehyde that is produced on heating are very irritating to the eyes, skin, and respiratory tract. Formaldehyde under some circumstances is a carcinogen.
 - c. Protective disposable gloves, face mask, and lab coat should be worn when handling paraformaldehyde.

- d. Protective disposable gloves, coveralls, head cover, boots, and a gas mask must be worn if it becomes necessary to enter a room containing formaldehyde vapors.
2. Other disinfectants, acids, cleansers, and all parasiticides are potentially toxic and irritating to the eyes, nose, and skin. Special precautions must be used when handling the concentrates of these agents.
 - a. In any case, gloves must be worn if there is potential for contact with the hands.
 - b. Goggles must be worn if you are doing a procedure where there is potential for splashing the material into your eyes, and a face mask should be worn if you are doing a procedure that produces significant aerosol, such as doing a necropsy or disinfecting a room with the power washer.
 - c. A lab coat or protective rubber apron must be worn if you are doing a procedure that would wet your regular working clothing.
 - d. If eyes or skin are contaminated, they should be flushed with large amounts of running water. If clothing becomes contaminated with these agents, clothing should be removed and washed before wear.
 - e. Material safety data sheets (MSDS) on chemicals used should be available nearby.
3. Experimental chemicals
 - a. Some chemicals used experimentally in animals have carcinogenic, mutagenic, or teratogenic potential in humans. Special precautions must be taken when working with these chemicals.
 - b. Warning signs must be posted naming the chemical and stating its danger.
 - c. Animals injected with or fed such chemicals must be housed in an area separate from other animals.
 - d. Use disposable cages to house contaminated animals. If this is not possible, do not mix reusable cages used for these animals with those from other toxicity studies or with equipment used with the general animal population. Personnel handling these cages should wear gloves at all times.
 - e. Bedding changes must be done under a hood.
 - f. Personnel caring for these animals must wear disposable gloves, head covers, face masks, foot covers, and coveralls when working in the area.
 - g. These clothing items must not be taken from the local work area. Disposable clothing and disposable equipment must be discarded into covered metal containers lined with plastic bags. Bags should be labeled with investigator's name, telephone number, and chemical used. This waste should be disposed of by incineration.

- h. Animal carcasses, bedding, and waste should be bagged, labeled as above, and disposed of by incineration.

HANDLING COMPRESSED GASES

1. Always use a hand truck for transport. Chain the cylinder to hand truck.
2. Do not transport tanks in closed vehicles.
3. Cylinders must be secured at all times. They should not be able to “slip” under a confining chain.
4. Do not drop cylinders, or otherwise permit them to strike each other.
5. Leave valve cap on cylinder until the cylinder is secured and ready for use.
6. Electrically ground all cylinders containing flammable gases.
7. Use tanks only in an upright position.
8. All valves should be closed when the tank is not in actual use.
9. Use the proper regulator for the particular gas.
10. Carefully open valves and adjust gas flow rates.
11. Always consider cylinders to be full and handle accordingly.
12. Discontinue using a high-pressure cylinder when the pressure approaches 30 psi, clearly mark EMPTY, and then remove for return to vendor.
13. Oily (not specially cleaned) fittings should never be used with oxygen. Oxygen under pressure will rapidly oxidize oil or grease, resulting in an explosion. Equipment cleaned for oxygen service must be used.
14. Gas equipment should not be pressurized. A general rule is no pressure greater than 10 inches of water should be used without special protective equipment.
15. Never mix gases in a cylinder. Explosion, contamination, corrosion, and other hazards can result.
16. Cylinders containing large amounts of flammable gas (e.g., hydrogen, acetylene, and ethylene) should be stored outside in a protected area and piped into the working area.
17. Store tanks in a fire-proof, well-ventilated area.
18. Storage area temperature should be regulated and not exceed 100°F.

19. Store gases supporting combustion (e.g., oxygen, chlorine) at least 25 feet from fuel gases, preferably in another gas storage area.

BIOHAZARDS ASSOCIATED WITH TYPES OF ANIMALS

Humans usually are not susceptible to the common infectious diseases of most laboratory or farm animals. There are, however, important exceptions. Infections of animals may, on some occasions, produce significant disease in people. These infections are called zoonotic diseases. They are communicated from animals to humans (or vice versa). In many cases the animals show little, if any, sign of illness. A microorganism in the normal flora of a healthy animal may cause a serious disorder in a person exposed to that organism. Whereas animals develop “resistance” to these microorganisms, humans with no previous exposure to the agent (or if the person is immunocompromised) lack this protective immunity. Therefore, one should be aware always of possible consequences when working with each type of animal and then take precautions to minimize the risk of infection. In the event that you do become ill with a fever or have some other sign of infection, it is important to let a physician caring know of the work you do with animals.

There are common sense steps that can be taken to lessen the risk of infection in general, including cleanliness in routine tasks conducted around animals and hand washing after completion of animal work. Investigators should protect themselves against contact exposure by wearing gloves; substituting manually operated pipettes for needles and syringes, and cannulas for multiple needle “sticks”; taking enough time to give injections properly; and by using a two-person team to restrain and inoculate animals. Further precaution should be taken by cleansing thoroughly the inoculation site. Do not recap or bend, clip, or break needles. Discard needles and other sharps in designated, puncture-resistant containers located as close to their site of use as is practical.

In addition to zoonotic diseases, all personnel should be aware that laboratory animals (particularly rats, rabbits, guinea pigs, hamsters, and cats) are sources of potent allergens to sensitized persons.

Rodents and Rabbits

Practically all rabbits and rodents (and some dogs) are procured from vendors having animal colonies free of human and animal pathogens. After receipt, these animals are usually maintained specific pathogen-free (SPF) through use of proper control measures (e.g., quarantine and health-monitoring, including laboratory tests). Thus the chance of contracting an infectious disease from a small laboratory animal is small. The most significant hazards associated with these animals are the possibility of developing or exacerbating an allergy (see discussion of laboratory animal allergies) and being bitten or scratched.

Contact with rodents requires precautions against such diseases as toxoplasmosis, tapeworm infection, rat bite fever, lymphocytic choriomeningitis (LCM), and salmonellosis, as well as ringworm and other dermatomycoses. Additional concerns for investigators using wild rodents are leptospirosis, hantavirus, and bubonic plague. Attention should also be paid to the possibility of allergic reactions.

LCM, a rodent neurologic virus, is transmissible to man. To reduce exposure to LCM, care must be taken when handling rodents as well as potentially infected materials, such as bedding and feces.

Wild rabbits can carry tularemia.

Dogs and Cats

Dogs and cats are often obtained from sources other than colonies bred for research purposes. Therefore, their health status and history are unknown and their pathogen status must be considered suspect. Because of known serious zoonotic diseases, including rabies, care and discretion must be exercised around these animals. In addition to rabies, cats can transmit toxoplasmosis that can cause birth defects if a pregnant woman is infected early in gestation. The most frequent injuries associated with dogs and cats are bites, scratches, and allergies.

Dogs and cats used in long-term studies at Mississippi State are vaccinated against rabies. An exception may be made for those animals used in acute experiments or in surgical practice. Even though those animals are under a veterinarian's supervision, some risk of exposure to rabies exists because the observation period may be too short to allow typical development of the symptoms of the disease in dogs to develop. All animal caretakers handling dogs and cats should consider being vaccinated against rabies. Investigators, students, and other staff who come in contact with dogs or cats, particularly animals obtained from pounds, are encouraged to have the pre-exposure rabies prophylaxis.

Parasites such as intestinal round and hookworms from dogs, some tapeworms, and sarcoptic mange are a potential risk to persons handling infected dog feces or skin. Ringworm, a fungus disease of the skin, is also a common infection in cats and is readily transferable to man. Those working with dogs and cats should be conscious also of possible allergic reactions.

Cat scratch disease ("cat scratch fever") is a zoonotic infection characterized by regional lymphadenitis following a skin papule at the site of the cat scratch. Although the prognosis is usually excellent and the disease is self-limiting, an examination by a physician is recommended.

Farm Animals

Farm animals such as cattle, swine, goats, sheep, and poultry are purchased from various sources, usually without complete information on their health and immunization history. This dictates the need for care in handling these animals and taking appropriate measures such as quarantine and isolation to control and identify diseases, especially those transmissible to man. Two common laboratory acquired infections associated with these species are cryptosporidiosis and Q-fever.

Q-fever is most commonly associated with sheep and is a particular problem when working with pregnant sheep and newborn lambs. *Cryptosporidium* (protozoan) occur in ruminant feces. Care must be taken when working with farm animals to avoid contact with urine and feces and bites, scratches, kicks, and sprains.

Q-fever, a potentially serious human disease caused by the rickettsia *Coxiella burnetii*, was formerly quite common among people drinking unpasteurized milk and in slaughterhouse workers exposed to the tissues of freshly slaughtered cattle, sheep, and goats. The organism is concentrated in and shed abundantly from placental membranes of sheep, and this route of exposure has been the cause of cases of Q-fever pneumonia in laboratory workers. Sheep used in reproductive research or other studies may be examined serologically for possible infection, and personnel working where exposure is possible should take extra precautions. It is recommended strongly that all pregnant ewes be treated as if they were Q-fever positive and protective measures taken. Gloves, mask, and protective clothing are recommended for individuals working with sheep and goats. Infected persons can be treated effectively with antibiotics.

Erysipelas in pigs can be transmitted to man and cause a severe focal skin infection, and pigs showing diagnostic lesions (diamond shapes on the skin) should be handled with care. Similar appearing though less severe skin lesions are also seen on human hands after contact with sheep and goats infected with contagious ecthyma or “orf,” or with vesicular stomatitis.

Rabies can also be a threat in large animals, such as cattle and horses. For workers with cattle or horses, pre-exposure rabies prophylaxis is encouraged.

Feral Animals and Unusual Laboratory Species

Non-traditional laboratory animals are used sometimes in research. These species may include ferrets, opossums, muskrats, and various amphibians and reptiles. Most such species will be maintained in an isolated, restricted setting with specific safety instructions. Birds can carry diseases such as psittacosis, histoplasmosis, and avian tuberculosis. Only inspected and properly quarantined birds should be used in research studies or teaching demonstrations.

Rabies can be a threat in blood-sucking bats. Therefore, personnel working with this species are advised to have the pre-exposure rabies prophylaxis.

Salmonella is frequently harbored in turtles and other reptiles and in amphibians. Gloves and good hand washing are always recommended during and after contact with reptiles and amphibians.

Transmission of Diseases

The term zoonosis is applied to diseases naturally transmitted from animals to man (or *vice versa*). Because zoonoses adversely affect personnel morale, public relations, and medico-legal concerns, it is important to recognize the potential problems of a zoonosis in each laboratory. The possibility of disease transmission from animals to man is influenced by several factors:

1. The susceptibility of the individual.
2. The length of time the animal is infective.

3. The length of the incubation period in animals. This period is important in some diseases with a long incubation period, because the animals may be used and killed before the disease becomes infective for humans and before the illness becomes clinically apparent in the animal.
 4. The stability of the agent. This is most important in direct transmission, in which the agent is exposed to environmental changes.
 5. The population density of animals in the colony.
 6. Husbandry practices. Routine maintenance procedures often contribute to the dispersion of infective material. Control of insects and wild rodents is important because vermin may act as vectors.
10. The virulence of the agent.

Summary

Not all laboratory animals or their tissues are free of zoonotic diseases, although most animals can be used safely if there is an awareness of the potential risks and hazards and adherence to procedures. The purpose of this document is to describe safe procedures for working with animals.

CONCLUSIONS

The generally low incidence of disease caused by exposure to laboratory animals tends to generate a false perspective of their overall significance in laboratory animal management. The prevention of one epidemic or even one case of a serious human disease in laboratory workers justifies continuous effort expended toward disease control. Man's use of animal models to improve human conditions has introduced many new and exotic laboratory animal species. With them comes the possibility of introducing diseases unreported previously in man.

The preventive measures discussed in this review should be part of a comprehensive program based on the following principles.

1. An assessment of the health status and/or exposure level of employees and the provision of diagnostic services and treatment for work related illnesses.
2. Construction of facilities and implementation of comprehensive sanitation to minimize cross contamination among different animal species and contact between animals and humans.
3. A continuing education program for employees, emphasizing zoonosis and other hazards associated with working with animals and meticulous personal hygiene.

In the final analysis, the success of a preventive medicine program depends on the cooperation and conscientiousness of each individual toward his/her daily work. An uncompromising attitude toward zoonosis control is the best protection against diseases shared by man and animals.