Introduction

Welcome to the Using Animals for Teaching, Testing, and Research at UAB (AU_UA) Module Two Course Material. The goal of this module is to make you aware of some of the health and safety risks involved while working with research animals and what you can do to minimize these risks.

Objectives

At the conclusion of this module, participants will be able to:

1. Recognize the types of risks involved in working with research animals.
2. Implement preventive measures to minimize risks.
3. Carry out all facility access and security procedures.
4. Implement the correct procedures when responding to an emergency.
5. Comprehend any warning signs on a chemical label.

Recognizing Hazards

Health vs. Physical

Depending on the type of chemicals used, damage can target specific organs or body systems. It may result in cancer, diabetes, reproduction issues, and genetic changes.

Hazardous Substance

A hazardous substance is a material or substance that poses a physical or health hazard. Health Hazards occur when a chemical produces an acute or chronic health effect on exposed individuals. Physical properties of a substance determine a Physical Hazard.
Physical Hazard Examples:

- Nephrotoxin: A toxic chemical that damages the kidneys (e.g., Cisplatin, Aminoglycoside, Antibiotics, Indomethacin).
- Hepatotoxin: A toxic chemical that damages the liver (e.g., Ethanol, Halothane, Carbon Tetrachloride).
- Teratogen: A toxic chemical that causes malformation of an embryo (e.g., Alcohol).

For more detailed information on health and physical hazards, see Two Group of Hazards.
Acute vs. Chronic

Acute hazards cause immediate harm (e.g., Carbon Monoxide poisoning, Cyanide inhalation, etc.). Chronic hazards do not cause immediate harm (e.g., Mesothelioma from Asbestos exposure, lung cancer from smoking, etc.).

Routes of Exposure

The four routes of exposure are ingestion, inhalation, injection, and skin contact.

Toxicity

Toxicity is the degree to which a toxic chemical can cause damage. The dosage, duration, and type of exposure to chemicals affect toxicity.

Permissible Exposure Limit’s (PEL’s)

PEL’s are good indicators of how long you can be exposed to a hazard. PEL’s are only intended to protect healthy workers. Therefore, it is essential to minimize exposure to toxic chemicals whenever possible. “Routine exposures” should be reduced whenever possible by:

1. Substituting with less hazardous materials.
2. Using engineering controls (Dry Box, Fume Hood, etc.).
3. Wearing the appropriate Personal Protective Equipment (PPE).

Other Types

Sharps

Needles, scalpels, broken glass, or other sharp objects may lead to cuts or puncture wounds. Injuries may be complicated if these items are contaminated with biological or chemical agents or with radioactive materials.
To minimize sharps injuries, you should be:

- Disposing sharps in puncture-resistant and leak-proof containers.
- Avoiding needlestick injuries by immediately placing used needles in appropriate containers. **Do not recap needles.**

**Pressurized Containers**

**Compressed Gas Cylinders** may become a dangerous projectile when damaged. To minimize risk, you should move cylinders with care and secure them with approved restraints in an upright position so they will not fall. You should use valve covers when the cylinder is not utilized.

**Autoclaves** contain steam under pressure. To minimize risks, you should maintain equipment, contact your on-site maintenance department for repairs, and avoid forcing the door open before the end of the cycle.

**Single Color or Low Lighting**

Some animal housing can be under “red lights” or low lighting conditions. This condition may make it difficult for you to see in the room or may cause eye fatigue. To minimize risks, work carefully and reduce the time you spend in places with low light or with lights of a single color.

**Ultraviolet Radiation**

Ultraviolet (UV) Germicidal Lamps are used to sterilize work surfaces such as Biological Safety Cabinets (BSC). Exposure to UV lights injures unprotected skin and eyes. To avoid injury, always turn off the blue-colored UV lights before working in BSC’s or other areas equipped with these germicidal lamps.

If your work is conducted in a Fume Hood, Biosafety Cabinet (BSC), or Clean Air Station you must complete [Biosafety Cabinets and Fume Hoods (OHS_BIO304)](#).
Monitoring Exposure to Ionizing Radiation

A dosimeter measures a person’s total exposure to ionizing radiation. You should wear a dosimeter to monitor exposure to ionizing radiation as part of your work. Do not wash dosimeters or leave them in direct sunlight because the readings may become altered.

If you work with or around Radioactive Materials, you must complete Radiation Safety Initial Training Sessions (OHS_RS102).

Ergonomic Hazards

Performing the same motion over and over may injure muscles or tendons. Repetitive actions may also cause carelessness due to boredom and loss of concentration. To minimize risk, you should be:

- Varying movements or assignments to reduce repetition.
- Using lifting equipment or split the load. Ask a co-worker to help you.
- Using two-handed lifting techniques and lift with your legs. Avoid sudden movements.

Loud Noises

People exposed to noise levels that exceed 85 decibels (dBA) in an 8-hour period, should participate in the hearing conservation program (Section CII). This program teaches you what protective measures to take while doing your job.

Fire & Other Emergency Evacuations

1. Familiarizing yourself with the evacuation routes and designated congregation areas for each facility in which you work.

2. Recognizing how and when to evacuate.
   a. You will be notified to leave the building by a bell, siren, public announcement system, or visual cues (such as flashing lights).
      If the magnetic locks securing the exit doors do not automatically release, press the door release button, and you will be able to exit as usual.
   b. Do not try to evacuate any animals. Your safety must come first!
3. Fire drills are mandatory for everyone.
   a. Fire drills are held periodically allowing personnel an opportunity to practice safe and efficient evacuations. Such exercises also allow personnel from the Department of OH&S and the ARP to assess the program and equipment. You are expected to participate in these drills!

Anesthetic Gases

Continued exposure to waste gases can result in adverse short and long-term effects of those exposed. The UAB ARP and the IACUC do not allow the use of ether for anesthesia due to its flammability and explosiveness. To minimize the risk, you should be evaluating anesthetic machines periodically to ensure proper function, its ability to scavenge waste gases, and using a fume hood when appropriate.

Injuries While Using Machinery

Machinery can be a source of crushing or pinching injuries. To minimize risk, you should be avoiding exposed moving parts and familiarizing yourself with emergency escape procedures or shut-off mechanisms.

Falls Due to Slipping or Tripping

Floors wet from spills or cleaning may lead to slips or falls. Wet floors also increase the possibility of electrocution if electrical equipment is in use. To minimize the risk you should wear footwear that is appropriate for the job, and clean up spills as quickly as possible.

Zoonotic Diseases

Some minor diseases in animals are life-threatening in humans. Being aware of possible consequences of working with each animal species allows personnel to take precautions to minimize the risk of disease exposure. The virus may be present in the urine, feces, blood, saliva, and the tissue of infected animals.
**Safety Equipment**

**Storage**

You should store chemicals according to compatibility and hazard class. Storing them alphabetically, or by carbon number, or by physical state, etc. are not acceptable practices. OH&S recommends segregating them by **EPA Segregation Guidelines**.

- Storing flammable liquids in quantities greater than 10 gallons in a flammable storage cabinet.
- Acids and bases stored separately and storing oxidizers away from organic materials that could react to cause a fire.
- Always store corrosive and other hazardous chemicals below eye level. Never store chemicals on the floor. Use secondary containment for liquids.

**Fume Hoods**

If a hazard cannot be eliminated or substituted, the best approach is to use engineering controls to keep the hazard from reaching the worker. Examples are fume hoods, glove boxes, and biosafety cabinets.
PPE

**Lab Coats**

**Must never be worn outside the work area.**

- Protect your skin and personal clothing from any incidental contact.
- Provide a removable barrier in the event of an incident involving a spill or splash of hazardous substances.
- Must be offered in different types and styles. Your selection must **match** the type of hazard present in the lab.
- Must be clean, buttoned, and long-sleeved to provide protection from chemical splashes.
- Must be of 100% cotton or treated with a flame retardant material.
- Wear an impenetrable apron and sleeves for more protection if needed. When working with highly toxic substances, you must tuck the sleeves into the gloves.

**Gloves**

Selecting the right glove depends on your work, substance used, SDS Recommendation, and breakthrough time. **No one type of glove protects against all chemicals.** You should:

- Check gloves for holes and tears before use.
- Change disposable gloves as soon as they become contaminated.
- Wash hands with soap and water before leaving the lab.
Glasses, Goggles, and Shields

Before donning glasses, goggles, or face shields make sure that you are wearing the appropriate one for the job. You should be:

- Using safety glasses whenever there is a chance of objects striking the eye. They are not appropriate protection from a chemical splash.
- Wearing splash goggles when working with liquids.
- Wearing a face shield with splash goggles when the splash hazard is high, or the chemicals are particularly dangerous.

Respirators

The selection and use of respirators require specialized training. Before wearing a respirator, employees must undergo medical screening, training, and for testing. Anyone who needs to wear a respirator for their work should contact OH&S at (205) 934-2487.

Labeling

The original label of the chemical is the best source of information to acquire knowledge about the hazards, emergency information, and storage. Original labels are required to have the following:

- Product Identifier
- Supplier Identification
- Precautionary Statements
- Pictograms
• Signal Words: (Danger or Warning). Danger means there is a severe hazard present and warning means there is a moderate to low hazard present.
• Hazard Statement
• Supplemental Information

**Pictograms**

These pictograms are required to be on any original chemical labels.
NFPA Diamond

The National Fire Protection Association (NFPA) Diamond helps determine if any specialized equipment, procedures, or precautions are needed. The four divisions are typically color-coded with red (flammability), blue (level of health hazard), yellow (chemical reactivity) and white (special hazards). Examples of special hazards are

- OX: Burns without an air supply
- W+: Reacts with water violently
- SA: Simple Asphyxiating Gas

Within these different color-coded squares you may see a number (1-4) or a letter. The higher the number, the more severe the hazard will be.

Warning Signs

These stickers or signs could save your life. Know them so that whether you see them on a sign or animal cage, you’ll know what to do.

This icon indicates that substances are in the area that may produce or promote cancer.

This icon indicates that a toxic substance is in the area that is harmful to humans.

This icon indicates that there are radioactive materials in the area.
Safety Data Sheets (SDS)

UAB has subscribed to a chemical database called ChemWatch. ChemWatch allows an SDS to be accessible from any computer on the UAB Campus, within UAB Medical System, or connected via VPN. Employees are strongly recommended to review the SDS before starting to work with any new chemicals. An SDS must be available to all employees working in the area. Contact UAB’s Department of Occupational Health and Safety (OH&S) at (205) 934-2487 if you need assistance in obtaining Safety Data Sheets (SDS).

Secondary Containers

You can use ChemWatch to print new labels. Secondary containers (e.g., squeeze bottles, spray bottles, flasks, tubes, etc.) are required to have:

- Same name as the original container
- All hazard class and target organ information as listed on the original bottle
- Date transferred

Contact UAB’s Department of Occupational Health and Safety (OH&S) at (205) 934-2487 if you need assistance in obtaining Safety Data Sheets (SDS).

Signage

One of the smartest actions you can take to protect yourself is to read the signage posted on the doors to each research area. If there are hazards present, you should see specific species and project information for that area.
Species Specific Information

These species-specific signs describe risks of trauma, infection, and allergy for well-trained, healthy, immunocompetent adults. Information included:

- Health status of the animals
- Cage system used
- Husbandry procedures
- Outerwear requirements to protect both personnel and the animals.
- Factors that may increase the risk and special considerations.
- Procedures for reporting and responding to work-related illnesses or injuries.

Project Specific Information

Animal Use Safety Information (AUSI)

The AUSI is designed to satisfy all informational requirements by the USDA, PHS, and AAALAC and is to be displayed only during the use of the potentially hazardous material.
It is the responsibility of the Principal Investigator to post this signage on the door to the animal room and be familiar with, adhere to, or use:

- List of approved hazardous agents administered to animals
- Universal warning symbols
- Procedures for handling waste and disposal
- Minimum precautions to protect workers exposed to animals (PPE and procedures)
- PPE and procedure
- Warning stickers on the cage cards that match the signage on the door

**Facility Access and Security**

To protect animals, personnel, and property UAB has card readers for access to animal facilities. **Do not loan out your card key!** To activate your card key for access, you must have documentation of training for animals, regulations, chemical safety, and enrollment in the Occupational Health Program. There are other precautions you can take to help.

- Make sure everyone associated with the lab, including secretaries and other administrative staff members, understand the work performed.
- Do not allow unauthorized access to an animal housing area or laboratory.
- Do not give unidentified callers information about your animal research.
- Do not photograph or videotape animals or animal housing areas without prior coordination with media relations and notification of ARP supervisory personnel. (For more information, read the UAB IACUC Policy on Media Access and Photography/Video of Animals.)

**Controlled Substances**

Working in research often requires one to work around and administer a variety of drugs. Examples of drugs used in research are Pentobarbital, Ketamine, and Valium®.
Animal Biosafety Levels

The Centers for Disease Control and Prevention (CDC) recognizes four safety categories for work with experimentally or naturally infected animals.

Assigning a level is based on these characteristics:

- Disease severity and transmission of the agent
- Availability of immunization or treatment
- The relative risk of exposure created by handling the agent and caring for the infected animals

Animal Biosafety Level 1 (ABSL1)

ABSL1 agents are not known to cause disease in healthy adult humans consistently, and there are no special precautions for housing the animals. You should observe all standard laboratory practices.

Animal Biosafety Level 2 (ABSL2)

ABSL2 agents are considered a moderate risk of causing human disease by ingestion, skin contact, or mucous membrane exposure. You should use extreme precautions with needles or sharp instruments to avoid self-inoculation, good personal hygiene, frequent hand washing, and correct use of PPE. Examples of agents at this safety level are Salmonella, Shigella, Human Immunodeficiency Virus (HIV), Listeria, and many of the viral vectors used for gene therapy research.
Animal Biosafety Level 3 (ABSL3)

ABSL3 agents cause severe and potentially lethal infections in humans and are spread by aerosol. Use those practices described for work with ABSL2 agents with an added focus on control of airborne transmission and use of biosafety cabinets for containment. Examples of agents in this safety level are Lymphocytic Choriomeningitis Virus, Monkeypox Virus, and *Coxiella burnetii*.

Animal Biosafety Level 4 (ABSL4)

These are exotic agents that present a high risk of life-threatening disease in humans and for which there is no proper treatment. An example many people may be familiar with is Ebola virus. UAB has no facilities to accommodate studies using agents classified as ABSL4.

Allergies

Allergic reactions to animals are more common than diseases caused by microbial or parasitic agents. The allergen is usually a protein or glycoprotein that is on the fur in the animal facility environment. Inhalation or direct contact is typically the route of exposure. Reactions to exposure occur within minutes to hours in sensitized people. They range from mild to life-threatening.

Some medical conditions may increase the risk of illness or injury for personnel working with research animals. If you have a situation that could increase your susceptibility, it is crucial for you to discuss your job duties with your physician and that you make your supervisor aware of any accommodations.

Risk Groups

The risk groups for developing allergies to laboratory animals are described in *Occupational Health and Safety in the Care and Use of Research Animals*, NRC, 1997.

- **Normal Group:** Despite repeated animal contact, people with no history of the allergic disease have only about 10% chance of developing allergies to laboratory animals.
• **Atopic Group**: People with the pre-existing allergic disease who become sensitized to animal allergens have a 70% chance of eventually developing symptoms.

• **Asymptomatic Group**: People who are asymptomatic but who have immunoglobulin E antibodies to allergenic animal proteins have up to a 100% chance of developing allergic symptoms with continued exposure.

• **Symptomatic Group**: People with clinical symptoms of exposure to allergenic animal proteins are the highest risk group and are more likely to develop severe symptoms or permanent impairment if exposure continues.

### Types of Reactions

**Typical**

The responses to animal allergens are typical allergic reactions that may include itching, raised red spots on the skin, watering eyes, runny nose, and sneezing. The following conditions result from a typical reaction.

- **Contact Urticaria**: A condition in which the skin itches, looks red and blotchy, and may develop welts or hives.
- **Allergic Conjunctivitis**: A condition in which the eyes itch; there is excessive tearing, swelling, or redness.
- **Allergic Rhinitis**: A condition in which the nose itches; there is clear nasal drainage, nasal congestion, or sneezing.

**Serious**

In some people, reactions are more dangerous. These responses can include:

- **Respiratory Problems (Asthma)**: A condition characterized by some or all of the following symptoms: coughing, wheezing, chest tightness, and shortness of breath.

- **Anaphylaxis**: A condition characterized by all or some of the following symptoms and can appear quite rapidly: generalized itching, hives, throat tightness, eye or lip swelling, difficulty swallowing, hoarseness, shortness of breath, dizziness, fainting, nausea, vomiting, abdominal cramps, and diarrhea.
Minimizing Risks

What is ARP doing?

The ARP takes the following measures to reduce the level of animal allergens in the building environment.

- Controlling airflow and humidity in the facility.
- Housing animals in filtered cages.
- Removing soiled bedding from cages in laminar flow change stations or Biosafety Cabinets.

What is OH&S doing?

You must participate in the OH&S Employee Health Program. Healthcare professionals who support this program are knowledgeable about the risks associated with animal research. For more information about this program, contact UAB OH&S at (205) 934-2487.

Responding to an Emergency

Familiarizing oneself with the information contained on the label or in the SDS for each chemical in the lab is imperative to reacting quickly and appropriately.

Chemical Exposure

See the Quick Reference Guide on the IACUC website.

Work-Related Injuries or Illness

Prompt medical attention may reduce the risk of serious health consequences after an exposure event.

If you are injured or believe you may have been exposed to a disease-causing agent or material while on the job, you are encouraged to seek medical attention. For more information see Responding to Work-Related Injuries or Illnesses.
Conclusion

This section concludes Using Animals for Teaching, Testing, and Research at UAB (AU_UA) Module Two Course Material. Before you access the third module of this course, you must take the assessment for this module. The passing score is 80% or higher.