

Working Safely with Laboratory Rodents: Preventing Injury and Zoonotic Disease Transmission

The VSU IACUC occupational health and safety program is designed to inform individuals who work with animals about potential zoonoses (diseases transmitted to humans from animals), personal hygiene to prevent zoonotic transmission, and other potential hazards associated with animal exposure. This information sheet is directed toward those involved in the care and use of laboratory rodents.

Injuries from Handling Rodents

Scratches and bites can be inflicted by laboratory rodents. People who handle laboratory rodents for research or teaching should be provided with training in proper handling techniques to avoid injury to themselves or the animals, such as specific handling and restraint techniques and protective clothing requirements.

Potential Zoonotic Diseases

Colony-born rodents are generally docile but may occasionally inflict injury such as a bite or scratch. While rodents may carry organisms that may be potentially infectious to humans, the major health risk to individuals working with laboratory rodents is the development of an allergy. The development of disease in the human host often requires a preexisting state in which the immune system is compromised. If you have an immune-compromising medical condition (e.g., AIDS/HIV positive or have had the spleen removed) or you are taking medications that impair your immune system (steroids, immunosuppressive drugs, or chemotherapy), you are at higher risk for contracting a rodent disease and should consult your health care provider. Potential rodent zoonoses include:

Rat Bite Fever (Haverhill fever): Rat Bite Fever is caused by *Streptobacillus moniliformis* or *Spirillum minus*. These organisms grow in the oral cavity and upper respiratory tracts of asymptomatic rodents, primarily rats and mice. Rodent colonies do not harbor these microorganisms. The usual source of infection is the bite of a carrier rodent. Incubation period of *S. moniliformis* in humans is a few hours to three days, and one to six days for *S. minus*. Symptoms include inflammation at the injury site and may be followed by lymphadenopathy, fever, headaches, malaise, myalgia, and/or chills. If not treated properly, complications may include arthritis, pneumonia, hepatitis, pyelonephritis, enteritis, and endocarditis.

Lymphocytic choriomeningitis: Lymphocytic choriomeningitis (LCM) is caused by the arena virus commonly associated with hamsters, but does infect mice. LCM is rare in laboratory animal facilities and more common in the wild. Transmission to humans is through contact with infected tissues including tumors, feces, urine, or aerosolization of any one of these. Disease in humans generally consists of flu-like symptoms that range from mild to severe. Under certain circumstances, lymphocytic choriomeningitis infection can be fatal.

Campylobacter: This is a gram negative bacterium that has a worldwide distribution. Although most cases of human Campylobacteriosis are of unknown origin, transmission is thought to occur by the fecal-oral route through contamination of food or water or by direct contact with infected fecal

material; houseflies may be a vector, as the organism has been isolated in them. *Campylobacter* is shed in animal feces for at least six weeks after infection. Symptoms in humans are acute gastrointestinal illness: diarrhea with or without blood, abdominal pain, and fever. *Campylobacteriosis* may cause pseudoappendicitis and, rarely, septicemia and arthritis. Usually it is a brief self-limiting disease that can be treated with antibiotics.

Leptospirosis: Leptospirosis is a bacterium found in many animals but most is commonly associated with livestock and dogs. The source of infection can be from rats, mice, voles, hedgehogs, gerbils, squirrels, rabbits, hamsters, reptiles, dogs, sheep, goats, horses, and standing water. Leptospire are in the urine of infected animals and are transmitted through direct contact with infected urine or tissues via skin abrasions or contact with mucous membranes. Transmission can also occur through inhalation of infectious droplet aerosols and by ingestion. The disease in humans is a multi-systemic disease with chronic sequelae. An annular rash is often present with flu like symptoms. Cardiac and neurological disorders may follow and arthritis is a common end result.

Hantavirus Infection: Hantavirus occurs mainly among the wild rodent populations in certain portions of the world. Rats and mice have been implicated in outbreaks of the disease. A Hantavirus infection from rats has very rarely occurred in laboratory animal facility workers. Hantaviruses do not cause apparent illness in their rodent hosts. The host does, however, remain persistently infected for life and may shed virus for weeks in respiratory secretions, saliva, urine, and feces. Transmission to humans is via inhalation of infectious aerosols or dust. The bites of infected rodents may also transmit the disease, as virus is shed in the saliva. The form of the disease that has been documented after laboratory animal exposure is characterized by fever, headache, myalgia (muscle aches), and petechiae (rash) and other hemorrhagic symptoms including anemia and gastrointestinal bleeding. Different strains of Hantaviruses infect different host species, and the different strains cause different clinical syndromes.

Other Bacterial Diseases: There are several other bacterial diseases that are possibly, though rarely, spread through working with laboratory rodents. These include *Yersinia* and *Tularemia*. *Salmonellosis* and *Campylobacteriosis* may be acquired by contact and accidental ingestion of fecal material from infected rodents. Animals infected with these diseases may have diarrhea but some may show no symptoms of disease.

Allergic Reactions to Rodents

By far the greatest occupational risk to working with rodents is allergic reaction or the development of allergies. Those workers who have other allergies are at greater risk. Animal or animal products such as dander, hair, scales, fur, saliva and body waste, and urine in particular, contain powerful allergens that can cause both respiratory symptoms and skin disorders. The primary symptoms of an allergic reaction are nasal or eye symptoms, skin disorders, and asthma. See [Allergy and Asthma Concerns](#) for more information.

How to Protect Yourself

Wash your Hands: The single most effective preventative measure that you can take is thorough, regular hand washing. You should wash your hands and arms after handling rodents or contaminated cages or materials. Proper technique involves the following steps:

- Wet your hands with clean running water (warm or cold) and apply soap.
- Rub your hands together to make a lather and scrub them well; be sure to scrub the backs of your hands, between your fingers, under your nails, and up your forearms.
- Continue rubbing your hands and arms for at least twenty seconds (the time it takes to sing the "Happy Birthday" song from beginning to end twice).
- Rinse your hands and arms well under running water.
- Dry your hands and arms using a clean towel or air dry.

Washing hands with soap and water is the best way to reduce the number of germs on them. If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol. Alcohol-based hand sanitizers can quickly reduce the number of germs on hands in some situations, but sanitizers do **not** eliminate all types of germs. To use hand sanitizer effectively:

- Apply the product to the palm of one hand (read the label to learn the correct amount).
- Rub your hands together.
- Rub the product over all surfaces of your hands and fingers and up your forearms until they are dry.

Note that hand sanitizers may not be as effective when hands are visibly dirty.

Wear Personal Protective Equipment (PPE): When working with rodents or when handling animal tissues, body fluids, and waste, wear appropriate gloves for the task and wash your hands after removing gloves. Wear a dust mask or respirator when there is a risk of aerosol transmission of a zoonotic agent or when there is a medical history of allergies. (The Office of Environmental & Occupational Safety (OEOS) will assist if you need a respirator.) Wear dedicated protective clothing such as an apron or lab coat when handling animals and cleaning their cages. Launder the soiled clothing separately from your personal clothes.

Practice Good Hygiene: Cover abraded skin, cuts, scrapes or sores and do not allow wound contact with rodents, tissues or fluids, or contaminated housing materials. Avoid touching your face, eyes, nose, or mouth with unwashed hands or contaminated gloves. Never eat, drink, use tobacco products, or apply makeup in animal facilities or while handling animals.

Maintain the Work Environment: Keep animal areas clean and disinfect equipment after using it on animals or in animal areas. Use cleaning techniques that do not aerosolize contaminated materials.

Seek Medical Attention Promptly: If you are injured on the job when handling rodents or contaminated materials, promptly report the accident to your supervisor, even if it seems relatively minor. Clean any minor cut or abrasion immediately with antibacterial soap, and protect it from dirt and animal secretions until it has healed. Seek medical assessment and referral for treatment for more serious injuries or if you have an infected wound indicated by swelling, redness, pain, and draining fluids with or without a fever.

Tell Your Health Care Provider You Work with Rodents: Familiarize yourself about the animals that you will be working with and the potential zoonotic diseases associated with each species. If you are ill, even if you are not certain that the illness is work related, always mention to your health care provider that that you work with rodents. Many zoonotic diseases have flu-like symptoms and would not normally be suspected. Your health care provider needs this information to make an accurate diagnosis. Questions about personal human health should be answered by your health care provider.