

Protecting the Vivarium and Risks of Personal Rodent Pets at Home

Protecting the Vivarium

Rodents kept in the research vivarium are housed via specific husbandry practices to assure they are free of specific pathogens that can challenge their health and influence the integrity of the research data collected. Thus, various programs are in place to ensure the health status of our rodent populations. The structure of the building is kept intact and in good repair to prevent the entrance of vermin (e.g., doors properly sealed, etc.), and measures taken to control their presence within the vivarium (e.g., live rodent traps near feed storage, use of insect bait and traps, etc.). Rodent colonies are routinely screened for potential pathogens to verify their health status.

Wild rodents, pet rodents, and rodents used as food for other pets (e.g., feeder mice used to feed a pet snake) can carry zoonotic diseases and pathogens that could alter the health status of our rodent colonies. If individuals working with animals have pet rodents, it is important to consider the possibility that pathogens rodent pets may carry could be transmitted to vivarium animals through dander and fomites clinging to clothes and hair of the pet owner or wild rodent handler. Thus, the best practice to prevent bringing contaminants into the animal facility include the following:

- Avoid handling pet rodents prior to working with research rodents for that day.
- Shower and wear clean clothing into work each day working with research animals.
- Wash hands regularly and wear PPE as directed for each facility/room.

Health surveillance of rodent colonies is performed quarterly via diagnostic testing of sentinel rodents exposed to bedding dirtied by colony animals. Health status is determined for each room via serological testing, fecal and environmental swab PCR, and in-house laboratory assessments. Routine screening is intended to identify the presence of pathogens of concern as quickly as possible and limit their impact and spread. A list of pathogens routinely screened against include the following:

- Mouse profiles include MHV, MPV 1-5, MVM, MNV, TMEV, MRV/EDIM, Sendai Virus (SEND), *Mycoplasma pulmonis*, PVM, REO3, LCMV, Ectromelia virus, MAV1 and 2
- Rat profiles include RCV/SDAV, RPV, RMV, KRV, H-1, Rat theilovirus (RTV), *Pneumocystis carinii*, Sendai virus (SEND), PVM, *Mycoplasma pulmonis*, REO3, LCMV, CARB/*Filobacterium rodentium*, Hantaviruses (Hantaan & Seoul), *Clostridium piliforme*, MAV1 and 2.
- All rodents are also screened for pinworm and fur mite parasites, and select mouse rooms are screened against *Helicobacter*.

It is important to note that even robust routine surveillance may take weeks or months to detect the introduction of a pathogen of concern, heightening the importance of following procedures in place to contain infections before they are detected. Please be sure to wear appropriate PPE for each facility/room as indicated, wash your hands after working with animals, and change out PPE regularly. Opening a cage and handling rodents is the highest risk activity for potential pathogen transmission and allergen contact when working with rodents. Wearing the appropriate PPE and following the proper procedures when using change stations and biosafety cabinets limits the potential introduction and spread of pathogens from one cage to another. This also protects the animal user by limiting their exposure to potential allergens (more information on rodent related allergens below) and any experimentally induced infections.

Allergen Exposure with Rodent Handling

Individuals with exposure to rodents and rodent housing environments may develop allergic reactions to animal proteins (allergens). Animal allergens may be present in animal dander, hair, skin, urine, saliva, serum and any contaminated feed or bedding materials. Exposure to these allergens can occur via inhalation as well as contact with skin, eyes and mucous membranes. The signs and symptoms of an allergic reaction include nasal discharge

and congestion, conjunctivitis, tearing and eye itching, skin redness, rash or hives and lower airway symptoms (coughing, wheezing and shortness of breath). In extreme cases severe anaphylactic reactions to rodent bites have been reported. Individuals with a known allergy or symptoms suggestive of an allergic reaction related to a workplace allergen should report their concerns to their supervisor and consult a physician. For more information on rodent allergen associated asthma, please see The Centers for Disease Control and Prevention Website, *Preventing Asthma in Animal Handlers* (<https://www.cdc.gov/niosh/docs/97-116/default.html>)

Zoonotic Disease Associated with Rodents

Handling wild rodents and pet store purchased rodents can also expose individuals to zoonotic diseases. Often these diseases do not make the animal appear sick but can cause serious illness in humans. Individuals with specific medical conditions such as a chronic illness, immunodeficiency, and pregnancy may also be at higher risk of developing disease or complications from a zoonotic disease and should consult with their physician before working with animals. Additional information on zoonotic diseases can be found on the Center for Disease Control and Prevention Website, *Healthy Pets, Healthy People*.

Wild, outdoor-housed and pet-store purchased rodents are much more likely to carry infections than those raised and housed in a laboratory setting. Transmission of zoonotic diseases from rodents is primarily by direct contact, bites, contact with contaminated objects, or ingestion or inhalation of aerosolized dirty bedding, feces, and urine.

The majority of rodents housed on the Bloomington campus are bred and raised under strict hygienic conditions and are free of pathogens that could be transferred to people. Rodents captured from wild populations or that are purchased from a pet store or breeder who sells rodents as feed for reptiles may carry zoonotic diseases. If handling wild caught rodents, please refer to the ABSA International Zoonotic Fact Sheet (<https://absa.org/wp-content/uploads/2017/01/ZoonoticFactSheet.pdf>) and the CDC hantavirus guidelines ([CDC Hantavirus](#)) for more information. Other zoonotic diseases associated with rodents include rat bite fever, hantavirus, lymphocytic choriomeningitis virus, leptospirosis, salmonellosis, and campylobacteriosis.

Rat Bite Fever caused by *Streptobacillus moniliformis* or *Spirillum minus* is a bacterial infection of rodents that is transmitted through bites, scratches, direct contact with animals and their urine, saliva and feces or ingestion of contaminated food or water. Infected rodents typically exhibit no symptoms of disease. Humans initially present with fever, headache, swollen lymph nodes and possibly a rash or ulcer in the area of a recent bite or scratch wound. Any bites or scratches should be immediately washed thoroughly to minimize the risk of infection.

Rodents with hantavirus, lymphocytic choriomeningitis virus (LCMV) and leptospirosis usually do not exhibit signs of disease. The disease agents are typically shed in the urine of infected animals and people acquire the infection by inhalation, accidental ingestion and direct contact with contaminated urine or feces. These are occasionally transmitted from bite wounds and *Leptospira* can infect people through a break in the skin. These diseases often initially appear as mild flu-like illness in people but can progress to severe disease. LCMV infection can cause severe meningitis and hemorrhagic fever in people and is considered hazardous to an unborn fetus by causing pre-term delivery or other complications in pregnant women. Please refer to the CDC Hantavirus guidelines ([CDC Hantavirus](#)) if working with wild rodents or in rodent-infested areas and buildings.

Salmonellosis and other bacteria can be acquired through contact and accidental ingestion of fecal material from infected rodents, birds, and reptiles. Animals infected with these diseases may have diarrhea, but some may show no symptoms of disease. Any animal with diarrhea should be suspected of having a zoonotic disease. Symptoms of infection in people include diarrhea, vomiting, and abdominal cramps.

We can protect ourselves from most diseases by using the following basic hygiene procedures:

- Do not eat, drink, apply cosmetics or use tobacco products while handling animals or in animal housing areas.

- Wear personal protective equipment (PPE) as directed.
- Handle animals safely to avoid bites and scratches. Thoroughly wash any bite or scratch wounds and immediately report injuries to the appropriate parties.
- Wear gloves when handling animals, animal tissues, body fluids and waste and wash hands after contact.
- Wear dedicated protective clothing such as a lab coat or disposable gown when handling rodents. Launder the soiled clothing separately from personal clothes and preferably by LAR or lab supplied resources as applies.
- Report ill animals so that they can receive veterinary care.
- Keep animal areas clean and disinfect equipment after using it on animals or in animal areas.
- Dispose of all waste and potentially hazardous material in the appropriate manner to minimize risk to others and the environment.

Most importantly, familiarize yourself with the animals that you will be working with, and the potential zoonotic diseases associated with each species. If at any time you suspect that you have been exposed or acquired a zoonotic disease or injury inform your supervisor and seek medical care.

If you have further questions call Indiana University EHS.

References

- Centers for Disease Control and Prevention. Healthy Pets, Healthy People. ([Small Mammals | Healthy Pets, Healthy People | CDC](#))
- Centers for Disease Control and Prevention. Hantavirus Pulmonary Syndrome (HPS). ([CDC – Hantavirus Pulmonary Syndrome \(HPS\) – Hantavirus](#))
- The Centers for Disease Control and Prevention. *Preventing Asthma in Animal Handlers* (<https://www.cdc.gov/niosh/docs/97-116/default.html>)
- Washington State University Website. <https://iacuc.wsu.edu/zoonoses-associated-with-rodents/>
- The Association for Biosafety and Biosecurity. ABSA International Website. Biosafety Resources <https://absa.org/links/> . Zoonotic Fact Sheet- <https://absa.org/wp-content/uploads/2017/01/ZoonoticFactSheet.pdf>