

SUMMARY OF ZONOTIC AGENTS (BY RESEARCH ANIMAL)

(To access the complete University of CT Occupational Health and Safety Program for Animal Handlers go to the following link: <https://ehs.uconn.edu/biological-health-and-safety/>)

Disease Risks

1. In animal-associated research, there are several infectious disease concerns:
 - a) Animal to researcher/caretaker disease transmissions
 - b) Researcher/caretaker to animal disease transmissions
 - c) Animal to animal (between and among species) transmissions
 - d) Animal to debilitated, immunosuppressed, or pregnant human disease transmissions
 - e) Contaminated objects (animal housing, experimental probing equipment, etc.) to researcher/caretaker/animal transmissions
2. The University has a comprehensive program in place which, through processes for animal procurement, health monitoring, and selective use of quarantine, minimizes risk of human exposure to organisms of concern, including zoonotic agents. However, no program is 100% effective, and any personnel working with animals should be advised that they may be exposed to pathogens as part of their work. **The use of animals caught in the wild for research purposes is prohibited without approval from IACUC.**
3. Infectious disease risk may occur naturally (endemic diseases), accidentally (bites or scratches), from unknown exposure, or experimentally (as a part of the project or inadvertent contamination of other animals or people). Many bacteria, some parasites, fungi, and some viruses are not species specific, and may readily infect people and/or other animals. Infection resulting in disease depends on several factors, such as preexisting disease or immunologic state of the individual, the infecting agent's virulence and dose, or route of exposure. Some of the more common and/or serious infectious diseases (zoonoses) transmitted from animals used in research laboratories to humans include:

a. AMPHIBIANS

1. Mycobacteriosis, caused by *M. xenopi*, *M. fortuitum*, or *M. marinum*, and possibly others, can be transmitted to humans if the agents come in contact with wounds on the skin, so special care is needed when handling infected animals or their aquaria.
2. Chlamydiosis is another potentially zoonotic disease of amphibians. Also found in birds, this agent is mainly transmitted by the fecal-oral route. The use of gloves (when appropriate) when handling animals and washing hands when finished are important recommendations to minimize potential exposures. A face mask and eye protection may be appropriate when there is a potential for splashes.

b. AVIANS:

Birds can be a source of human infection such as: chlamydiosis (psittacosis), systemic fungal infections such as histoplasmosis, and enteric infections, including *Escherichia coli*, salmonellosis, shigellosis, and campylobacteriosis. Some are transmitted by aerosols being breathed in (psittacosis, histoplasmosis) while enteric infections are generally fecal oral route (salmonella).

1. Salmonellosis: An infection with the bacteria *Salmonella*. *Salmonella* are usually transmitted to humans by eating contaminated foods, however, in research and animal care settings it is most often associated with improper hand hygiene after handling animals, eating before washing hands or eating within the animal facility.
2. Psittacosis: *Chlamydophila psittaci* is the causative agent of a disease that is called chlamydiosis in birds. Common in psittacines (parrots, cockatiels, parakeets) and found in domestic birds (chickens, turkeys, pigeons, and ducks). Can be found in high concentrations in the droppings of infected birds. Close proximity to just one sick bird can cause infection or close contact with dried feces (inhalation hazards). Can cause respiratory illness that varies from flu like symptoms to systemic disease with pneumonia and possibly encephalitis.
3. Influenza: certain type A influenzas can be passed from poultry to humans and vice versa. There have been a few highly pathogenic strains of influenza that have created serious illness in humans (such as H5N1 high path strains found in Asia). These strains have not caused infection in the U.S as yet.

c. FISH

Contact of lacerated or abraded skin while manipulating fish or cleaning aquaria may lead to the contamination of the wound with *Mycobacterium* such as *Mycobacterium marinum*, *Vibrio*, or *Streptococcus* if any of these bacteria are present. These are opportunistic infections that can be prevented by covering existing cuts and following proper hand hygiene practices after working in or around fish tanks. Accidental infection of contaminated water can lead to gastroenteritis problems if *Aeromonas spp.* or *Edwardsiella tarda* were present in the tank. *Erysipelothrix rhusiopathiae* is a bacterium that may not cause clinical disease in fish but can be present and cause disease in humans, generally in the form of skin infections. Hand washing and avoiding hand to mouth contact and possibly eye protection may be appropriate to minimize exposure.

1. *Mycobacterium Marinum* (*M. marinum*) is a slowly growing bacteria that may cause disease in fish and people. Human infections by *M. marinum* are rare. People who have breaks in the skin such as cuts and scrapes may be at risk, when in contact with water from an aquarium or fish tank or when handling, cleaning, or processing fish. The most frequent symptom is a slowly developing nodule (raised bump) at the site the bacteria entered the body. Frequently, the nodule is noticed on the hand or upper arm. Later the nodule can become an enlarging sore (ulcer). Swelling of nearby lymph nodes occurs. This infection can also involve the joints and bones.
2. *Vibrio* species – in US, 3 species are most common cause of infection, *Vibrio parahaemolyticus*, *Vibrio vulnificus*, and a non-toxigenic strain of *Vibrio cholerae*. They can cause gastroenteritis, septicemia (infection of the blood), or wound infections, depending on the species. *Vibrio* wound infections cause pustules and lesions, as well as cellulitis.

d. RABBITS:

1. Pasteurellosis: *Pasteurella multocida* is most common species infecting humans. Most common symptom in humans is a local wound infection from a bite or scratch. Cases are characterized by severe pain and swelling within a few hours or up to a week post-exposure. Abscesses and bone and joint involvement may occur. Rarely pulmonary infections can occur as well as septicemia. Antibiotic treatment is usually required and is effective. Very common disease in rabbits, but uncommon in humans.

2. Tularemia: Systematic bacterial infection following pulmonary or percutaneous exposure. Can also be spread from bite of insects and direct contact with infected blood or tissue. Most common in wild rabbits.
3. Staphylococcus, Streptococcus: Although normal flora, these bacterial agents may cause septicemia or localized infection when transmitted to other hosts.

e. HORSES:

1. Leptospirosis: bacterial disease that can be spread by rodents contaminating food or water. Contagious bacterial disease to most farm animals. Can infect humans by oral route and through contact to skin or mucous membranes with water or soil that is contaminated with the urine of infected animals.
2. Salmonellosis – most animal species worked with on campus can potentially harbor salmonella. Salmonellosis is an infection with the bacteria Salmonella. Most people infected with Salmonella develop diarrhea, fever, and abdominal cramps within 12-72 hours of infection. The illness usually lasts 4 to 7 days and most recover without treatment. However, for some individuals diarrhea can be more severe and hospitalization is necessary.

f. REPTILES

1. Salmonellosis is the most relevant zoonotic disease for personnel working with reptiles. Cleaning and sanitation of animal facilities and equipment decreases the bacterial load in the environment. Personal protective equipment, such as disposable gloves and booties, and institutionally laundered lab coats should be worn when interacting with animals or their environment.

g. RODENTS (Mice/Rats/Hamsters/Gerbils/Guinea Pigs/others):

3. Rat Bite Fever: Febrile disease associated with swollen glands in humans caused by the bacteria, *Streptobacillus moniliformis* and *Spirillum minus* which are part of the normal oral flora in wild rodents (mice). The agents of rat bite fever are bloodborne pathogens. Refer to the UConn/EHS Bloodborne Pathogens Manual for more information. The disease in humans is a flu-like illness with fever plus joint and muscle pain. Transmission is nearly always via a rat bite, although infection via scratches inflicted by rats is theoretically possible. The disease is usually controlled by appropriate antibiotics.
4. Lymphocytic Choriomeningitis (LCM): The causative virus is commonly found in wild rodents. The disease in humans, a meningitis or flu-like disease, may result from contact with infected rodents or rodent tissue.
5. Leptospirosis: bacterial disease that can be spread by rodents contaminating food or water. Contagious bacterial disease to most farm animals. Can infect humans by oral route and through contact to skin or mucous membranes with water or soil that is contaminated with the urine of infected animals.
6. Hantavirus Pulmonary Syndrome: The causative agents are enzootic viruses of wild rodents (mice) that cause persistent, often symptomatic, infections in their natural hosts. Transmission occurs via aerosolized excreta (or saliva). Human infection occurs under conditions of close contact with the enzootic host. Most commonly found in the desert southwest but cases have been found on the east coast.
7. Yersiniosis: The bacteria can be found in wild rodents. *Yersinia pestis* (plague) is usually transmitted by flea bites to humans. Other *Yersinia* species cause bacterial enteritis.

h. RUMINANTS (Sheep/Goats/Cattle):

1. Orf: a highly contagious pox viral infection of small ruminants. Causes painful lesions around mouth in sheep. Can be transmitted by direct contact to humans. Gloves must be worn when handling infected animals.

2. Q fever: caused by bacterium *Coxiella burnetii* – an airborne agent that causes flu-like symptoms in humans. Can be fatal to those with heart valve problems. Highly concentrated in placental membrane and fluids. In most individuals, the disease manifests itself as an acute illness that could be mistaken for influenza and includes high fevers up to 104°F or 105°F that are accompanied by general malaise, significant muscle aches and pains, and very frequently by a cough. Up to half of the individuals who develop this acute disease will have a pneumonia that can be seen on chest x-rays. A large number of people will also develop hepatitis. In most patients, the disease is self-limiting and will resolve on its own after ten days to two weeks. In older or ill individuals, this acute illness may take one to two months to resolve.
3. Chlamydiosis: caused by the bacterium *Chlamydia psittaci*, causes abortion of infected ewes. Can cause abortion in pregnant women. The bacteria are excreted in high numbers in the aborted fetus, fluids, and membranes.
4. Listeriosis: caused by the bacterium *Listeria monocytogenes*, found in soil and water, can live for long periods in feces or silage. The animal gets infected from eating contaminated feed or water. In sheep and goats generally causes encephalitis. In pregnant women can cause spontaneous abortion.
5. Brucellosis: caused by the bacteria of the genus *Brucella*. Can cause abortion or weakened offspring. Can be passed to humans by contact through cuts, inhalation of the bacteria, or in contaminated milk or food. In humans causes undulant fever. Not common to the northeast.
6. Caseous Lymphadenitis (CL): Caused by *Corynebacterium pseudotuberculosis*. A potential zoonotic agent with the most common route of infection through cuts or contact with open wounds. Symptoms start with general malaise and muscle pain and swollen lymph nodes develop. Proper use of PPE, controlled access to animals, and disinfection of premises can provide personnel protection as well as maintain farm biosecurity limiting the spread to other susceptible animals.
7. Leptospirosis: Contagious bacterial disease to most farm animals spread by rodents contaminating food or water. Can infect humans by oral route and through contact to skin or mucous membranes with water or soil that is contaminated with the urine of infected animals.
8. Ringworm - Transmitted by direct contact with infected animal. Ringworm is a fungal infection. It is characterized by raised, reddened areas that form small, round circles. Proper sanitation after handling helps to prevent this disease. Ringworm is easily treated and will cure itself in most cases. Can be more of an issue for immune compromised individuals.

i. SWINE:

1. Erysipelas: The bacteria, *Erysipelothrix rhusiopathiae*, which is becoming more commonly recognized as a cause of serious disease in humans, causes this illness which is characterized by fever, arthritis and cutaneous lesions, and occasionally, heart valve damage and sudden death.
2. Brucellosis: caused by the bacteria of the genus *Brucella*. Can cause abortion or weakened offspring. Can be passed to humans by contact through cuts, inhalation of the bacteria, or in contaminated milk or food. In humans causes undulant fever. Not common to the northeast.
3. Leptospirosis: Contagious bacterial disease to most farm animals spread by rodents contaminating food or water. Can infect humans by oral route and through contact to skin or mucous membranes with water or soil that is contaminated with the urine of infected animals.
4. Campylobacteriosis: bacterial disease caused by *Campylobacter jejuni* contracted by ingestion of the organism. The young, elderly, or immune compromised are most readily affected.
5. Influenza – H1N1 outbreak of 2009 proved to be infectious between swine and humans. Influenzas have the potential to spread from swine to humans and from humans to swine. The seasonal flu vaccine can offer some protection to personnel and potentially limit chance of spread.