
Valdosta State University Institutional Animal Care & Use Committee

Standard Operating Procedure Number 011

PREVENTION OF ZOO NOTIC DISEASES

PURPOSE: This Standard Operating Procedure (SOP) provides information on zoonotic diseases, the transmission of diseases that are communicable to humans through the handling of laboratory animals, Valdosta State University's policy on training of animal use and animal care staff, and the wearing of protective garments designed to aid in the prevention of zoonoses.

DEFINITIONS:

Allergen - A substance, usually a protein, which can cause the immune system to react as if infected with a cold virus. Cats, rabbits, mice, rats, birds, and guinea pigs are the most frequently implicated allergy-causing species.

Animal – Any live non-human vertebrate animal used or intended for use in research, training, experimentation, testing, propagation, or related purpose, with the exclusion of embryos, tissue, and other biological samples.

- ♦ For embryos, the point in development at which oviparous, ovoviparous, and viviparous species become regulated animals is specified by the Animal Welfare Act (AWA) and the Office of Laboratory Animal Welfare (OLAW). Viviparous and ovoviviparous species become regulated at parturition from the maternal organism. Oviparous species become regulated when they hatch from the egg. For fish, the Valdosta State University IACUC has determined a similar stage in development as the “buttoned-up” stage (when the embryo has fully absorbed the yolk sac and must forage on its own).
- ♦ For tissues and other biological samples, only those that have been collected from a live animal by a Valdosta State University investigator are regulated.

Animal Bite or Exposure - Having one's skin pierced or abraded by animal teeth or claws, or by coming in contact with animal saliva or tissue on abraded skin, eyes, or mucus membranes or through needle stick after the needle has penetrated animal tissue.

Antigen - A substance that stimulates an immune response, especially the production of antibodies.

Bacteria - Ubiquitous, prokaryotic organisms occurring at high densities in water and soil. Bacteria are often maligned as the causes of human and animal disease.

Centers for Disease Control and Prevention (CDC) – The CDC is one of the 13 major operating components of the US Department of Health and Human Services (DHHS), which is the principal agency in the United States government for protecting the health and safety of the public. The CDC has remained at the forefront of public health efforts to prevent and control infectious and chronic diseases, injuries, workplace hazards, disabilities, and environmental health threats. The CDC applies research and findings to improve people's daily lives and responds to health emergencies.

Conjunctivitis - Commonly known as pinkeye, conjunctivitis is an inflammation of the conjunctiva, the clear membrane that covers the white part of the eye and lines the inner surface of the eyelids. It is a fairly common condition and usually causes no danger to the eye or vision. The inflammation can have many causes, the most common of which are infectious, allergic, and irritant. Infectious conjunctivitis is usually caused by either bacteria or viruses. Many different bacteria can cause conjunctivitis, but the most common are *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Staphylococcus aureus*.

Encephalitis - Encephalitis literally means an inflammation of the brain, but it usually refers to brain inflammation caused by a virus.

Fungi - Fungi are eukaryotic organisms that include molds, yeasts, and higher fungi. Fungal infections or mycoses are classified depending on the degree of tissue involvement and mode of entry into the host. These are

- Superficial – infection localized to the skin, the hair, and the nails
- Subcutaneous - infection confined to the dermis, subcutaneous tissue, or adjacent structures
- Systemic - deep infections of the internal organs
- Opportunistic - cause infection only in the immunocompromised

Human fungal infections are uncommon in normally healthy persons and are usually confined to conditions such as candidiasis (thrush) and dermatophyte skin infections such as athlete's foot. However, in the immunocompromised host, a variety of normally mild or nonpathogenic fungi can cause potentially fatal infections.

Hepatitis - An inflammation of the liver caused by either viral transmission or chemical toxins in the body. Untreated cases of hepatitis can lead to liver failure and even death.

- Hepatitis A - seen in epidemics and transmitted through fecal contaminated food and water
- Hepatitis B - transmitted by infected blood or blood products or sexual contact
- Hepatitis C - transmitted by blood from asymptomatic donors; may result in chronic disease
- Hepatitis D - occurs in conjunction with Hepatitis B and results in either acute or chronic disease
- Hepatitis E - often transmitted by fecal contaminated food in the tropics

Hepatitis disease is either acute (starts and ends quickly) or chronic (long-term progression).

Immunosuppressive Condition – A condition that results in a decrease in the normal response of the human immune system to invading viruses, bacteria, parasites, and tumors. (The immune system is the body's primary line of defense against disease agents, so weakening its response could increase the toll of disease).

Malaise – An indefinite feeling of lack of health often indicative of or accompanying the onset of an illness.

Meningitis - An inflammation of the meninges, the membranes that cover the brain and spinal cord. The inflammation is usually caused by bacteria or viruses (viral meningitis is also called aseptic meningitis). Less common causes include fungi, protozoa, and other parasites.

Mucociliary function – The ability of the cilia in the respiratory tract to function optimally. Alterations of mucociliary defense are most commonly the result of viral upper respiratory

infection. Viral infection has been shown to alter ciliary function, with a decrease in beat frequency and subsequent stasis of secretions.

Nematodes – Nematodes are simple roundworms. Colorless, unsegmented, and lacking appendages, nematodes may be free-living, predaceous, or parasitic. Many of the parasitic species cause important diseases of plants, animals, and humans.

The National Institute for Occupational Safety and Health (NIOSH) - The federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the CDC in the US Department of Health and Human Services.

Protozoa - There are over 50,000 species of protozoa, of which one fifth (some 10,000 species), are parasitic. They infect vertebrates and invertebrates, and some are even parasitic in plants. Parasitic protozoa are, in general, small, have short generation times, high rates of reproduction, and a tendency to induce immunity to reinfection in those hosts that survive. Structurally, a protozoan is equivalent to a single eukaryotic cell.

Psittacosis - An acute chlamydial (intracellular bacteria) disease that causes fever, headache, myalgia, and pneumonia-like respiratory illness. Associated with inhaling feather dust and dried bird droppings.

Zoonotic diseases (zoonoses) - Diseases that are communicable from animals to humans under natural conditions.

OCCUPATIONAL ANIMAL EXPOSURE: Both research and non-research animals have the potential to cause injury, transmit zoonotic disease, and/or cause allergic reaction to those who have contact. These animal hazards can occur by either direct contact from handling an animal or just by being in close proximity, i.e., working in or passing through an animal housing room.

TRAINING OF LABORATORY ANIMAL CARE STAFF: Staff members or qualified students who have occupational exposures to research and non-research animals will be provided with the appropriate awareness training. The responsibility for providing training or ensuring that staff members and students are trained is assigned to the Principal Investigator. Training must include routes of disease transmission, disease or allergy signs and symptoms, appropriate use of personal protective equipment, waste handling, and emergency contacts. The Office of Environmental and Occupational Safety (OEOS) is available to assist in the training process as needed. Records of training must be submitted to OEOS for each person working with or around research and non-research animals.

CLASSIFICATION OF ZOOSES: Zoonoses are organized by symptomatology, i.e., by the symptoms they might produce in humans. Not all disease syndromes are reviewed herein, and not all may present as indicated below. A full list of zoonotic diseases may be obtained from the Centers for Disease Control in Atlanta. The CDC also has a very comprehensive occupational hazards website that can be found at <http://www.cdc.gov/>.

As with other hazardous materials, persons handling or working near animals may be exposed to zoonotic diseases primarily by getting infective material on the skin, through cuts or breaks in the skin, in the mouth, in the eyes, or by inhalation of aerosolized particles.

SUSCEPTABILITY: Certain conditions might predispose individuals to increased susceptibility to these diseases. Such individuals might become infected more readily by zoonotic diseases or might develop a worse form of a zoonotic disease. These conditions include, but are not limited to:

- **Immune suppressive conditions** (HIV, chemotherapy, corticosteroid treatments, concurrent diseases, etc.). Any condition that hampers immune function lowers natural resistance to other disease. Individuals who are aware of a condition that might affect their immune system should discuss this with a doctor before handling or working in close proximity to animals.
- **Pregnancy.** Pregnant workers are also more susceptible to certain diseases. Because full development of some organ systems may be permanently affected, the growing fetus is especially vulnerable to some diseases. Women who are, or suspect they may be, pregnant should discuss this with a doctor before handling or working in close proximity to animals.
- **Chronic smoking.** Chronic smokers are at greater risk of diseases spread by inhalation because of lung damage and diminished mucociliary function. Individuals who are chronic smokers should discuss this with a doctor before handling or working in close proximity to animals. .
- **Chronic alcoholism.** Alcohol consumption, acute or chronic, can decrease a white blood cell called a ‘monocyte.’ This monocyte is responsible for fighting certain diseases. Chronic alcoholism further debilitates the immune system by decreasing several trace minerals and vitamins that are necessary for normal immune function. Individuals who consume alcohol on a regular basis should discuss this with a doctor before handling or working in close proximity to animals.

ANIMAL BITES, SCRATCH EXPOSURE, NEEDLE STICKS, AND OTHER PUNCTURE WOUNDS: Bites, scratches, and puncture wounds from needles used in animal research are potentially dangerous, not only from the physical damage standpoint, but also because of the potential of contracting zoonotic disease or inducing allergic reactions. Animal bites can become infected with a variety of bacteria that might lead to a more serious problem. When an employee or student incurs a bite wound or other injury or is exposed to potentially hazardous animal fluids while working with animals in VSU’s animal facilities, he/she is required to immediately report to Farber Health Services for first aid, to the Valdosta Family Medicine walk-in clinic (2412 North Oak Street, Valdosta; 229-244-1400) for treatment, or to the South Georgia Medical Center emergency room (2501 North Patterson Street, Valdosta; 229-333-1000) for emergency or after-hours care. In the event of injury in the field, the employee or student should report to the nearest hospital emergency room for treatment. Immediately thereafter, if not done already, he/she is required to report the incident to the IACUC Administrator; the principal investigator, supervisor, or faculty advisor; the Office of Environmental and Occupational Safety; and, if an employee, the Office of Human Resources for assistance with a Workers Compensation claim.

BITE PREVENTION: Animal care staff and animal handlers must be trained in and knowledgeable of species-specific animal handling techniques.

ALLERGIES: Allergies may develop to any kind of protein, in any kind of environment. Animal allergies can develop in pet owners, for example. Contact allergies are common in the laboratory animal industry and in the veterinary care industry because of chronic exposure. Exposure to animal-related allergens (fur, saliva, hair, dander, and protein from urine) may occur by inhaling contaminants or by direct contact.

- **Rodent contact allergy.** Workers with ongoing exposure to rabbits and rodents, such as laboratory workers or pet owners, are at higher risk of developing allergies to them. An individual may become hyper-sensitized to rodents mainly through exposure and inhalation of urine proteins that are aerosolized. Signs of allergies can vary widely and may include itching, hives, skin rash, flushing and inflammation; respiratory irritation and asthma; nasal, eye, or sinus symptoms; and in rare cases, shock. Wearing gloves and a NIOSH-approved N-95 (or better) respirator will diminish exposure to these antigens and theoretically will reduce the chance of developing these allergies.
- **Latex contact allergy.** Workers with ongoing latex exposure, individuals with a tendency to have multiple allergic conditions, people with spina bifida, and people with allergies to certain foods such as avocados, potatoes, bananas, tomatoes, chestnuts, kiwi fruit, and papaya are at increased risk of latex allergies. Acute reactions are most common, but they may also be delayed, resulting in a variety of symptoms hours or days later. These include itching, hives, skin rash, flushing and inflammation; respiratory irritation and asthma; nasal, eye, or sinus symptoms; and in rare cases, shock. To reduce the chance of developing a latex allergy, hand creams, perfumes or cologne should not be used on the hands while using latex gloves. These cause the latex to deteriorate, exposing the individual to more antigens. Hands should be washed after using latex gloves to remove any antigens on the skin. Areas contaminated with latex dust should be wiped down frequently.

The supervisor should be notified if an individual suspects development of an allergy from something in the workplace.

PERSONAL PROTECTIVE EQUIPMENT: *The Guide for the Care and Use of Laboratory Animals* suggests that animal care personnel wear appropriate institution-issued protective clothing, shoes or shoe covers, and gloves. Protective clothing should not be worn beyond the boundary of the animal facility or animal use area. Personnel working in areas where there is potential exposure to contaminated airborne particulate material or vapors should be provided with suitable respiratory protection. Protective clothing and equipment will be issued to animal care staff consistent with the risk associated with the research activities, hazards, and animal species involved.

- ♦ **Respirators** - The CDC recommends that workers protect themselves from diseases potentially spread through the air (such as viruses, tuberculosis, and psittacosis) by wearing a fit tested respirator *at least* as protective as a NIOSH-approved N-95 respirator. The “N” means it is not resistant to oils (used in other industries). The “95” indicates that it will remove 95% of the particles in the air. If the mask does not have the

letters “NIOSH” on it, it is not approved for these standards. If respirators are required for the work performed, a Respiratory Protection Program must be established through the Office of Environmental and Occupational Safety. The required elements of a respirator program include medical evaluation, fit testing, training, and equipment maintenance.

- ◆ **Gloves.** Gloves are recommended to prevent contact allergy to rodents and to prevent potentially infective material from getting on the skin or through cuts and breaks in the skin. Two types of gloves are typically used—latex and vinyl. Only latex is an effective barrier against infectious materials.
- ◆ **Surgical Scrub.** A surgical scrub or soap that contains a medical grade disinfectant should be used to wash the hands after handling animals and to cleanse scratches and bites. Label directions should be followed, including observing of appropriate contact times.
- ◆ **Eye Protection.** Protective glasses should be worn to prevent contaminated materials from making contact with the eyes.

ORGANISMS PRIMARILY CAUSING DIARRHEA:

The following organisms may cause diarrhea and dehydration. The conditions can usually be prevented by good hygiene, which includes wearing latex gloves, washing hands *before and after* using the bathroom, not eating and drinking in the lab or animal facility, and washing hands at the conclusion of work.

- ◆ ***Campylobacter.*** A not very common (probably underreported) bacterium usually associated with sheep and cattle, but also can be transmitted by many animals. In humans, it may also cause hepatitis, meningitis, fever, and, rarely, spontaneous abortion and premature delivery.
- ◆ ***Salmonella.*** A very common bacterium usually associated with birds and reptiles. However, many animals may be responsible for its transmission. Rodents have been reported to shed the disease. Salmonella infection usually presents with abdominal cramps, nausea, and vomiting that may develop into diarrhea. It may also be accompanied by fever, muscle aches, and malaise.
- ◆ ***Shigella.*** A rare bacterium (except in non-human primates). The resulting diarrhea might include blood and mucus. *Shigella* is probably very rare in other animals, but possible.
- ◆ ***Escherichia coli.*** *E. coli* is a very common bacterium. Diarrhea is the main sign of the disease. It is more commonly associated with farm animals and chickens but is possible in any species, because (ironically) man is the main shedder of this disease.
- ◆ ***Rotavirus enteritis.*** Usually occurs only in children and is more common during winter. It is extremely common in humans, with 60% of children worldwide exposed by their first birthday. It may be associated with nursing mice and is usually self-limiting in humans but has been reported to cause death in children.

- ♦ ***Cryptosporidium***. A protozoal disease that may produce profuse, watery diarrhea. Sometimes abdominal cramping, nausea, and fever may develop. It is primarily carried by cattle, chickens and turkeys, and humans. It is possible that any animal associated with humans could shed the disease.

ORGANISMS PRIMARILY CAUSING RESPIRATORY DISEASE: The following organisms may cause primary respiratory disease. Signs may include difficulty breathing, pain in the chest while inhaling, asthma-like signs, ocular redness or itching, and fever. While working with laboratory animals, most of these diseases can be prevented by good hygiene, which includes wearing latex gloves, wearing a NIOSH approved N-95 (or better) respirator, and washing the hands at the conclusion of work.

- ♦ ***Chlamydia psittissi***. A bacterium that causes the disease psittacosis. It is associated with birds of all types and can cause respiratory and flu-like signs as well as a chronic conjunctivitis.
- ♦ ***Pasteurella***. A bacterium that rarely may cause respiratory disease in humans, most often contracted through contaminated skin wounds.
- ♦ ***Mycobacterium avium***. A bacterium that is primarily associated with chickens and people who work with chicken manure. It can cause pneumonia and might be associated with any type of bird.
- ♦ ***Hantavirus***. A virus that has been associated only with the deer mouse, cotton rat, and rice rat in the Southeastern United States and the white footed mouse elsewhere. However, it has been that any rodent may carry the virus. It can cause “hantavirus pulmonary syndrome” with symptoms of fever, deep muscle aches, and severe shortness of breath.

ORGANISMS PRIMARILY CAUSING SKIN DISEASE: Persistently red lesions, itchy skin or bumps, or non-healing wounds might indicate exposure to one of the following zoonoses. While working with laboratory animals, most of these diseases can be prevented by good hygiene which includes wearing latex gloves, washing any bite wounds immediately in an antibacterial soap (such as a surgical scrub solution), and washing the hands after completion of work.

- ♦ ***Pasteurella***. A bacterium that can cause infected wounds resulting from bites and scratches, mainly from cats and dogs but also from rabbits and, rarely, rodents. Humans may also carry the disease. The first signs of pasteurellosis usually occur within 2 to 12 hours after a bite and include pain, reddening, and swelling of the area around the site of the bite. Pasteurellosis can progress quickly, spreading through the body from the bitten area. Untreated, this infection can lead to severe complications. Bites to the hand need special attention; if pasteurellosis develops in the tissues of the hand, the bacteria can infect tendons or even bones and sometimes cause permanent damage if appropriate medical care is not administered promptly. Red streaks and enlarged lymph nodes may indicate that a very serious septicemia is developing.

- ♦ ***Visceral larval migrans.*** May be caused by nematodes that penetrate the skin and become “lost” as they try to complete their life cycle in an unfamiliar host. The lesions tend to be small, sigmoid (curvilinear), and might be itchy.
- ♦ ***Dermatophytes.*** A variety of fungi that cause ringworm. The resultant lesions might be shaped in a red ring, but could be itchy, tingly, or burning red bumps or lines, as well.
- ♦ ***Mycobacterium.*** A bacterium associated with fish. It can be difficult to cure and is manifested by puffy, red, persistent, non-healing wounds.
- ♦ ***Sarcoptic mange.*** Caused by a mite that may be present on any domesticated animal. It is usually self-limiting and may cause itchy red bumps or lines.

ORGANISMS CAUSING OTHER DISEASES:

- ♦ ***Rabies.*** A viral disease that is transmitted primarily from saliva to blood (as in the case of bite wounds) from an infected animal. Without treatment, it is nearly always causes a fatal encephalitis in man. The vast majority of rabies cases reported to the CDC each year occur in wild animals like raccoons, skunks, bats, and foxes. Domestic animals account for less than 10% of the reported rabies cases, with cats, cattle, and dogs most often reported rabid. Any mammal could theoretically carry the virus, but it is primarily a disease of carnivorous mammals, and exposure would be highly unlikely in the rodent lab environment.
- ♦ ***Leptospira.*** A bacterium found in a variety of animals, but rodents seem to be well adapted to it and show no signs of disease. In other animals, including humans, symptoms may be quite varied. In humans, fever, flu-like signs, muscle aches, nausea, a stiff neck, conjunctivitis, bruising and bleeding, and jaundice might occur. The disease is spread primarily through the urine of infected animals and is most commonly associated with farm animals and urine contaminated water, soil, and foods. Hygiene and personal protective equipment should provide protection.
- ♦ ***Rocky Mountain Spotted Fever, Toxoplasma, and Brucella.*** Other zoonotic diseases of interest that are more likely be encountered in the veterinary field because of close contact with ticks, dogs, cats, and cattle. They are less likely to be encountered in a laboratory environment, but are listed here for informational purposes.
- ♦ ***Rat-Bite Fever.*** Caused by *Streptobacillus moniliformis* or *Spirillum mino*. These organisms are in the respiratory tracts and mouths of rodents, especially rats. Most human infections are the result of a bite wound. Symptoms include chills, fever, malaise, headache, and muscle pain. A rash can develop along with painful joints, abscesses, endocarditis, pneumonia, hepatitis pyelonephritis, and enteritis.