

GENERAL ZOOTIC TRAINING

ZOONOSIS (pl. ZOONOSES)... simply speaking, these are diseases that humans can *catch* from animals. “Reverse” Zoonoses are diseases humans can *give* to animals, such as tuberculosis. There are at least **120** zoonoses worldwide, and about 70% of all “Emerging Infectious Diseases” (EIDs) in the world today are ZOONOSES.

Zoonotic diseases can be transmitted by bacteria, viruses, fungi, prions, and parasites, and can be carried by most animal species, affecting humans in leisure activities as well as at work. Simply being outdoors can expose you to zoonoses such as “West Nile Virus” (transmitted by mosquito bites). Although very few people contract zoonoses in a university setting (because of good technique and training) it is important that you be able to recognize the signs and symptoms of these diseases so you will seek prompt treatment if they occur.

TETANUS... is a neurological disease that causes severe muscle spasms, pain, and usually death. The organism is a normal inhabitant of soil and also animal and human intestines. Tetanus spores are introduced into the body through a wound contaminated with soil, street dust or feces. It can also be introduced through lacerations, burns, and punctures. Onset is gradual, occurring over 1 to 7 days, characterized by painful muscular contractions (primarily of the neck muscles, secondarily of trunk muscles) and abdominal rigidity. It progresses to severe generalized muscle spasms, aggravated by any external stimulus, and then death in most cases.

After complete primary tetanus vaccination, antibodies persist at protective levels in most persons for at least 10 years, in which case boosters need be given only every 10 years if wounds are minor and uncontaminated. For other wounds a booster is appropriate if the patient has not received tetanus toxoid within the preceding 5 years.

To summarize:

Everyone needs a "routine" Td booster (Td) **every 10 years**. A booster is needed **after the 5th year** at the time of any of these injuries:

- Deep wound that closes over itself
- "Dirty" wound, especially with farm dirt or possible animal manure contamination
- Spider bite (necrosis)
- Human, or animal bite
- Puncture, including by knife, nail, or any other sharp item
- Eye injury
- Severe Burn (necrosis)

"UNEXPLAINED" ILLNESS.... Some ZOONOSES, such as *West Nile encephalitis and tick diseases*, cause brain inflammation, which causes neurological symptoms similar to head injuries (headache, nausea, vomiting, stiff neck, light sensitivity, etc.), but these diseases usually *also* cause fever, and muscle and joint pain. **Always get immediate medical care for these symptoms, especially if sudden, severe, or unexplained.**

For example, “flu” in the summer may be a sign of a tickborne disease. You should not delay treatment, and you should advise the health care provider of your work with animals and/or outdoor exposures (such as to mosquitoes or tick bites).

ANIMAL-RELATED ALLERGIES... ...One of the most important health hazards of working with animals, feed, and bedding material. About 30% of people with pre-existing allergies may eventually develop allergy to animals. Approximately 10% of these will develop symptoms of animal-induced asthma. Allergies can become so severe that you may not be able to continue working with animals. Respiratory allergies, if present, usually start with runny nose, itchy eyes and sneezing, but can progress to asthma or even anaphylactic shock. If you suspect an animal allergy is developing, consult a doctor immediately. Medication can be prescribed to prevent a worsening condition. A “dust mask” may be used to keep dust away from your face -- let your instructor or farm manager know if you’d like to wear one. Further information; <http://www.cdc.gov/niosh/animalrt.html>

BITES AND SCRATCHES... should be immediately washed with soap and water and reported to your supervisor or instructor. Additional info: <http://www.mayoclinic.com/findinformation/firstaidandselfcare/index.cfm>

BLOODBORNE PATHOGENS (HUMAN AND ANIMAL) and the USE OF “UNIVERSAL PRECAUTIONS...”

All human blood and body fluids are considered a potential source of disease. When assisting an injured person, assume he or she is infectious and don’t get their blood or body fluids into your system. **Avoid:**

- *blood/body fluid splashes onto your mucus membranes*
- *Innoculation by puncture (including human bites)*
- *blood/body fluid contact with your broken skin (abrasions, hangnails, cuts, eczema, psoriasis, poison ivy, etc.)*

Similarly, when working with animals, treat all animal body fluids, tissue and waste as potentially infectious “just in case,” and be careful not to introduce animal blood or other excreta into your body. Even “healthy looking” animals can sometimes harbor diseases that don’t make *them* sick but can make *you* sick. Needles must be placed directly into a “sharps container” rather than being recapped. Recapping can result in a needle either missing the cap or going through the cap into your finger. Neither is very pleasant, and can result in serious diseases (especially in the case of a human blood exposure). In addition to the “zoonoses,” there are “dirty wound” bugs such as strept and staph that can cause infections when introduced into our bodies.

“DIRTY WOUND” BUGS, TOXINS, AND “ABSCESS” vs. “CELLULITIS”... A pustule or abscess *obviously* indicates that you have an infection. However, a non-purulent indication of infection called **“Cellulitis” can occur when bacteria produce a toxin**

under our skin after a bite or injury. Cellulitis is characterized by redness, heat, swelling, pain, and tissue damage (necrosis) and is often similar in appearance to snake or spider bite damage, but is caused by a bacterial toxin rather than a protein. Therefore, cellulitis is treated with antibiotics to kill the bacteria, which in turn stops the toxin damage from progressing. A “tetanus” (Td booster) is also needed for cellulitis if it’s 5 or more years since your last booster.

IMMUNOCOMPROMISE/IMMUNOSUPPRESSION (REDUCED IMMUNITY TO DISEASE)...This can be congenital, caused by HIV/AIDS or other diseases that impair the immune system, cortisone/steroids or other medications, chemotherapy, radiation, etc. Certain animal exposures and zoonoses can be very serious (or sometimes fatal) for persons with reduced immunity to disease. ***If you suspect your immune system may be abnormal, seek medical attention for diagnosis, treatment and determination as to whether or not animal exposure is safe for you. Do this immediately.***

GASTROINTESTINAL ILLNESSES... Many bacteria and viruses are transmitted to humans by hand to mouth contact (specifically “fecal-oral”). Salmonellosis, Campylobacteriosis, Giardiasis, and Cryptosporidiosis are some diarrheal zoonoses diseases spread in this manner. If you’ve just handled an animal or its' excreta, bedding, or other substances and haven’t washed your hands, you can unknowingly introduce these disease organisms into your system when you touch your eyes or mouth, smoke a cigarette, or eat lunch. The primary way to protect yourself from zoonotic diseases is to practice good personal hygiene – especially by good hand washing and keeping your fingers out of your mouth.

- **SALMONELLOSIS.....**Reservoirs include a wide range of domestic and wild animals including poultry, swine, cattle, rodents, and pets such as iguanas, tortoises, terrapins, turtles, chicks, rabbits, monkeys, guinea pigs, parakeets, snakes, dogs, cats, and humans. Transmission is by fecal-oral contamination, producing a watery, profuse diarrhea for about 10 days. **Antibiotics are not very effective, and the illness can be lethal for those persons with a suppressed immune system.**
- **CAMPYLOBACTERIOSIS.....***C. jejuni* is considered to be one of the principal bacterial agents causing enteritis and diarrhea in man. It is found in ruminants, swine, dogs, cats, chickens, turkeys, waterfowl, and rodents. Transmission is usually from a handler not washing his or her hands after handling an animal that has diarrhea caused by this organism.
- **CRYPTOSPORIDIOSIS...***C. parvum* is a tiny, one celled parasite that can reside in the intestinal epithelium of many different species of animals and birds. Most normal healthy individuals exposed to this parasite never show clinical symptoms, but severe diarrhea may occur in the very young, the elderly, and those who are sick or immunosuppressed. There is no specific effective treatment for this, so dehydration, weakness, collapse and death may occur.

Avoid contact with sick animals and use good hand washing technique after handling animals or cleaning their cages or pens.

- **GIARDIASIS...** is a protozoan infection principally of the upper small intestine that can be associated with diarrhea and other symptoms. It can be spread by contaminated food or water and human or animal fecal-oral contact. Usually more serious in immunosuppressed individuals.

LATEX ALLERGY... sensitivity can develop to latex gloves and other materials. All students and employees should become familiar with the signs and symptoms of latex allergy: <http://www.cdc.gov/niosh/latexalt.html>

COMMON ZOOSES... This list is only a general guideline. These diseases and exposures are not limited to the following species, and these animals may cause other diseases not listed:

- Animal Allergies - most commonly from rodents, rabbits, cats, birds, dogs, horses
- Brucellosis - cattle, sheep, dogs, swine
- Campylobacteriosis - ruminants, swine, dogs, cats, poultry, waterfowl, rodents
- Cryptosporidiosis - dairy cattle (calves), other farm animals, pets, reptiles, rodents
- E. Coli - pigs, poultry, cattle
- Ecthyma Contagiosum - sheep, goats, deer, and other ungulates
- Hantavirus Infection - wild rodents
- Q Fever - sheep, goats, cattle, some wild animals, ticks
- Latex allergy - rubber latex
- Leptospirosis - wild rodents, raccoons, ruminants, cattle, swine, dogs
- Listeriosis - fish, birds, swine, horses, ruminants, guinea pigs, ferrets, gerbils, rabbits, Lymphocytic Choriomeningitis (LCMV) - rodents, transplantable tumor lines
- Psittacosis (Chlamydiosis) - birds, rodents, rabbits, swine, ruminants, cats, ferrets, frogs
- Rat Bite Fever - rodents
- Rabies - wild mammals and unvaccinated domestic animals including farm animals
- Salmonellosis - reptiles, horses, swine, cattle, poultry, and in meat processing
- Tetanus - universally present
- Tick-borne Diseases - field studies, outdoor activities
- Toxoplasmosis - cats, meat processing
- Tuberculosis - non-human primates, fish, birds
- West Nile Virus - spread by mosquitoes to animals and humans

Laboratory and Classroom Animal Training

The following precautions are necessary to protect yourself and your family from disease while working with animals in classes or labs:

- Gloves should be worn and hands washed after glove removal.
- Many zoonoses are spread by fecal-oral contamination. To prevent this, no eating, drinking, applying cosmetics or contact lenses, or smoking is allowed in areas where animals or their excreta are present.
- Lab coats, safety glasses, and other personal protective equipment (as indicated by the nature of the exposure) must be worn to prevent the spread of organisms to you or outside the class or lab (i.e., home to your family). A normal, healthy adult may have only mild symptoms when infected with a zoonotic disease, but the same organisms can be fatal to infants, the elderly, and those with a weakened or suppressed immune system:

IMPAIRED IMMUNE SYSTEM (IMMUNOSUPPRESSION OR

IMMUNOCOMPROMISE: This can be congenital or caused by HIV/AIDS or other diseases, cortisone or other medications, chemotherapy, radiation, etc. Certain animal exposures and zoonoses can be very serious (or sometimes fatal) for persons with reduced immunity to disease. ***If you suspect your immune system may be subnormal, seek immediate medical attention for diagnosis, treatment and determination as to whether or not animal exposure is safe for you.***

ANIMAL RELATED ALLERGIES... are exaggerated reactions of the body's immune system to animal proteins. The most important animal allergens have been found in the urine of rats and in the urine, saliva, and fur of guinea pigs. Other allergens include rabbit fur, cat saliva and dander, dog dander, and horse serum and dander. Exposure to animal urine and feces may occur either through direct contact with skin or by inhaling dust that has been contaminated with urine or fecal material. Some insects, frogs, and birds can cause respiratory symptoms in sensitized individuals.

Animal related allergy is one of the most important health hazards encountered by laboratory animal workers. It is estimated that about 30% of persons with pre-existing allergic conditions such as allergic nasal drainage might eventually develop allergy to animals. Approximately 10% of these will have symptoms of animal induced asthma. Symptoms range from mild (runny nose, watery eyes, sneezing) to serious (cough, chest tightness, wheezing, or shortness of breath). Scratches or direct contact with animal hair or skin may result in hives, welts or chronic skin rashes. In sensitized workers, reactions can occur soon after exposure or may be delayed 2 to 8 hours or more. Persons sensitized to domestic animals such as cats and dogs are more likely to develop sensitivity to laboratory animals than non-allergic workers. These symptoms can lead to permanent disability or require a career change, so workers at risk for developing symptoms should take precautions to avoid or minimize exposures. The following measures are recommended:

- Perform animal manipulations within ventilated hoods or safety cabinets when possible
- Wear designated clothing (not regular street clothes) while working with animals
- Leave work clothes at the workplace to reduce your own period of exposure to allergens and to

Minimize potential exposure for family members.

- Keep cages and animal areas clean
- Reduce skin contact with animal products such as dander, serum, and urine by using gloves, lab coats, and approved particulate respirators with face shields or safety glasses

Remedial action for workers with early symptoms can reduce the risk of increasing sensitivity, and early medical treatment is advised. Contact the occupational health nurse for further information or assistance in obtaining a respirator.

LISTERIOSIS... caused by *Listeria monocytogenes*, a gram positive rod found in fish, birds, swine, horses, ruminants, guinea pigs, ferrets, gerbils, rabbits, and chinchillas. The principle reservoir of the organism is in forage, water, mud, and silage. Papular lesions on hands and arms may occur from direct contact with infectious material or soil contaminated with infected animal feces. Can be symptom-less or cause fever, headache, nausea, and vomiting progressing to serious complications. Fatality rates may exceed 20%, but it can be treated with antibiotics. Prevention/control is through use of protective clothing and gloves when handling animals and their excreta. Pregnant women and immunocompromised individuals should avoid contact with potentially infective animals and known infected humans.

LEPTOSPIROSIS... is caused by a bacteria transmitted to humans in the urine of infected animals of all species. . Ingestion, accidental parenteral inoculation, and direct or indirect contact of skin (through minor skin lesions) or mucous membranes (i.e., conjunctiva of unprotected eyes) with cultures or infected tissues or body fluids (especially urine and blood) during handling, care, or necropsy are the primary laboratory hazards. The incubation period is usually 7-13 days, and the onset is usually abrupt, with influenza-like symptoms. These include fever, headache, chills, severe muscle pain. Gastrointestinal symptoms can also occur, as well as eye redness. May be mild or progress to severe illness with death. Prompt recognition and specific treatment with antibiotics is essential. Gloves and safety glasses are recommended for the handling and necropsy of infected animals and when there is the likelihood of direct skin contact with infectious materials.

SALMONELLOSIS... This was discussed under [General Zoonotic Training](#), but bears further emphasis ... Certain strains of *Salmonella* cause illness in both humans and animals, while others affect only humans, so the outside appearance of an otherwise healthy animal may be deceiving. Transmission is by ingestion of the organisms in food derived from infected food or animals or contaminated by feces of an infected animal or person. Reservoirs include a wide range of domestic and wild animals including poultry, swine, cattle, rodents, and pets such as iguanas, tortoises, terrapins, turtles, chicks, rabbits, monkeys, guinea pigs, parakeets, snakes, dogs, and cats. Reservoirs also include humans. Salmonellosis may be acquired by handling reptiles or other animals that have been exposed to their own feces or by cleaning the cages of infected animals. Symptoms develop within 6 to 72 hours with sudden onset of headache, fever, abdominal pain and cramps, nausea, vomiting, and diarrhea, usually lasting at least 3 to

5 days. **Antibiotics are not very effective, and the illness can be lethal for those persons with a suppressed immune system.**

Laboratory and Classroom Animal Training: Rodents

These are a few of the specific rodent-borne illnesses that might be contracted through work with lab rodents. As indicated, prompt medical treatment is necessary if one of these diseases is suspected. Be sure to advise your health care practitioner of your work with lab rodents.

RAT BITE FEVER (RBF)....refers to two similar systemic diseases caused by different anaerobic bacteria: Streptobacillary RBF is caused by *Streptobacillus moniliformis* (gram neg. rod) and Spirillary RBF caused by *Spirillum minus* (gram negative spiral). These organisms can be found in the nasal and oro-pharyngeal secretions of healthy laboratory rats (10% to 100%) and in the wild rodent population 50% to 100%). Mice, squirrels, weasels, gerbils dogs and cats may also transmit the disease by bites or scratches. Most cases result from bites or scratches by wild or lab rats, but can also be introduced by direct contact with secretions or blood of an infected rodent, as well as ingestion of food or water contaminated by feces. Symptoms in Streptobacillary RBF: Usually characterized by prompt healing of wound with minimal local irritation and minimal lymphadenitis. Onset (usually 2-10 days) of relapsing fever, joint pain and swelling, followed by rash on extremities, soles, and palms. Headache, nausea, vomiting may also be present. Recovery is usually spontaneous within 2 weeks, but further complications may occur, and 13% of untreated cases are fatal. Symptoms in Spirillary RBF: usually characterized by an ulceration of the bite wound with regional adenopathy and joint pain. Prevention is through reduction of animal bite risk, and immediate first aid treatment for all animal bites (wounds should be scrubbed vigorously with 1% povidone-iodine scrub for 10 minutes). Promptly seek medical attention regarding need for prophylactic antibiotics and tetanus/diphtheria booster (Td).

LYMPHOCYTIC CHORIOMENINGITIS VIRUS (LCMV) is important as a natural infection of laboratory animals. The natural reservoir is the domestic mouse (*M. musculus*); infected females transmit infection to the offspring, which become asymptomatic persistent viral shedders. Infection also occurs in mouse and hamster colonies and in transplantable tumor lines. LCMV is widely distributed among wild mice throughout most of the world and presents a zoonotic hazard. Human cases have occurred in houses where infected mice were caught. Athymic, severe-combined-immunodeficiency and other immunodeficient mice can pose a special risk of harboring chronic infections, and can present a hazard to laboratory personnel.

The virus is transmitted to humans by parenteral inoculation, contamination of mucous membranes or broken skin with infectious tissues or fluids (blood, cerebrospinal fluid, saliva, nasal secretions, urine, feces, semen, and milk) and from infectious aerosols. Bedding material and other fomites contaminated by LCMV are potential sources of

infection, as are infected ectoparasites. The virus can be transmitted to the fetus in pregnancy: Human-to-human transmission has not been documented.

SYMPTOMS: The incubation period is 1-3 weeks. Typical LCMV infection in adults is biphasic, with an influenza-like illness characterized by fever, headaches, malaise, myalgias, and anorexia nausea, vomiting, pharyngitis, cough, and adenopathy followed by a pause and a second phase of CNS disease. However, CNS symptoms may appear without any prodrome or may never develop. In severe cases of the disease, patients might develop a maculopapular rash, lymphadenopathy, and, rarely, orchitis, arthritis, and epicarditis. Meningitis and meningoencephalitis are the most frequent neurologic manifestations of the disease, although myelitis, Guillain-Barré syndrome, and sensorineural deafness have been reported. Very few patients progress to aseptic meningitis, which is characterized by a very high lymphocyte count in the cerebrospinal fluid. CNS involvement has resulted in several deaths. Intrauterine LCMV infection has resulted in fetal or neonatal death, as well as hydrocephalus and chorioretinitis in infants. Prevention of this disease in the laboratory is achieved through the periodic serological surveillance of new animals that have inadequate disease profiles and of resident animal colonies at risk, and through screening for the presence of LCMV in all tumors and cell lines intended for animal passage. Laboratory work with feral mice should be performed utilizing appropriate zoonotic precautions and guidelines. Appropriate engineering controls, work practices and procedures, personal protective devices, and training are all essential in preventing spread of disease to humans and into colonies of immunosuppressed animals.