CRYPTOSPORIDIOSIS
Cryptosporidiosis is caused by infection with a protozoa in the genus Cryptosporidium. Infection has been diagnosed in ruminants (i.e. sheep, cattle), pigs, cats, dogs, chickens, ferrets, nonhuman primates, and humans. Clinical disease in animals is most frequently diagnosed in young livestock who have not developed a sufficient level of immunity to the organism. Calves and lambs may have severe watery diarrhea. Chickens may have respiratory tract disease. The organism is most frequently transmitted by ingestion of contaminated materials but may also be transmitted by aerosols. The organism can survive in the environment for extended periods.

In humans, the disease may not induce any signs of illness or may be characterized by severe watery diarrhea, fever, nausea, vomiting, anorexia, weight loss, or respiratory illness. These symptoms usually occur within 5 to 28 days of exposure. In otherwise healthy individuals, the illness is usually self-limiting (1 to 2 weeks) and only supportive care is required. However, a more severe and chronic disease may develop in immunocompromised patients. Transmission of the disease can be prevented through utilization of good personal hygiene and by wearing personal protective equipment especially when working with young animals with diarrhea.

Additional information regarding Cryptosporidiosis can be found at: http://www.cdc.gov/parasites/crypto/

GIARDIASIS
Numerous mammals including dogs, cats, nonhuman primates, pigs, sheep, and goats, can all be natural hosts for giardia, a protozoa. Additional laboratory animals (i.e. rabbits, mice) can become infected with Giardia. However, due to the strictly controlled environment in which the animals are raised, natural infection is unlikely. Infected animals may not show any signs of illness or may exhibit diarrhea, weight loss, vomiting, or anorexia. Management of infected animals includes sanitation of the environment, prompt removal of feces, and treatment with antiparasitic agents. Giardia infection is transmitted to humans when a person ingests infected fecal material such as when a fecally contaminated glove or piece of equipment contacts a human's mucous membranes. Infected humans may develop diarrhea, a loss of appetite, abdominal cramps, vomiting, fever, and chills. These signs appear approximately 7-10 days after infection. Infection is diagnosed by testing of a stool sample and is treated with antiparasitic agents as well as through supportive care. The practice of good personal hygiene, such as hand washing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel.
HERPES B VIRUS
Herpes B virus (Cercopithecine Herpesvirus-I) is a common virus infecting macaque monkeys, including rhesus macaques and macaque-derived cell cultures. Baboons are not known to be naturally infected. Although extremely rare, infection in humans is usually fatal.

Infected macaques are usually asymptomatic. However, lesions including blisters or ulcers may develop in and around their mouth and on their genitalia. Often these lesions appear very similar to cold sores or fever blisters in humans. Once infected, an animal will harbor the virus throughout its life. It is important to note that infected animals frequently do not display any lesions or signs of illness. Therefore, it is prudent to assume that all macaques are infected with the virus.

Herpes B virus can be transmitted from infected macaques to humans through bites, animal scratches, scratches from contaminated equipment, needle-stick injuries, mucous membrane exposure (i.e. splashes to the eyes, nose, or mouth), and contamination of broken skin with the body fluids of macaques. The virus is not transmitted through the air. Human cases of Herpes B infection are extremely rare but most frequently fatal. Initial symptoms in infected humans may include flu-like illness (fever, chills, nausea, vomiting, and dizziness), sinusitis, and persistent headaches and often develop within 1-3 weeks of exposure. Lesions (blisters, redness) may also be seen at the site of the exposure. The infection frequently develops to an ascending encephalomyelitis (infection of the brain and spinal cord) and eventually results in death.

With the use of appropriate precautions, the risk of a human contracting the infection is extremely low. In the event that a potential exposure does occur, implementation of appropriate and immediate first aid procedures is vital to decrease the potential for disease transmission.

All University of Michigan personnel working with non-human primates are required to attend the UCUCA training course entitled, "Non-Human Primate Zoonoses - Bite/Scratch/Splash Kit First Aid Training." Specific policies and procedures related to the prevention of Herpes B virus transmission are discussed.
http://www.oseh.umich.edu/pdf/monkeybitescratch.pdf

Additional information regarding the Herpes B virus can be found at:
http://www.cdc.gov/ncidod/diseases/bvirus.htm
LEPTOSPIROSIS
A spirochete bacteria, *Leptospira interrogans* can infect a wide range of laboratory animal species including mice, rats, hamsters, guinea pigs, gerbils, dogs, cats, pigs, sheep, hamsters, and nonhuman primates. However, infection is highly unlikely in animals specifically bred and raised for use in research. Infection can result in varying symptoms across species. Mice and rats may be asymptomatic, while dogs may exhibit kidney and liver disease and sheep may experience reproductive failure. Nonhuman primates may exhibit blood clotting abnormalities or abortion. Transmission to humans may occur if the individual’s abraded skin or mucous membranes come in contact with the urine or tissues of infected animals or equipment contaminated with these substances. It is also possible for humans to contract the disease through inhalation of fine particles of contaminated fluids that may be generated during high-power washing of contaminated equipment. Symptoms in humans may include fever, chills, weakness, pain, and headache. The severe form of the disease results in impaired kidney and liver function, as well as mental status changes, and possible death. The best methods of control are good sanitation with appropriate animal waste control and appropriate use of personal protective equipment when handling animals.

Additional information regarding Leptospirosis can be found at:
http://www.cdc.gov/ncidod/dbmd/diseaseinfo/leptospirosis_g.htm

RINGWORM (DERMATOPHYTOSIS)
Ringworm can be found in the following lab animal species: dogs, cats, guinea pigs, nonhuman primates, sheep, and goats. The causative organism is a fungus, not a worm, which may infect fur/hair, skin, and nails. The organism can persist in the environment for extended periods of time. Infected animals may not exhibit any signs of infection or may develop areas of alopecia (hairloss) and erythema (redness/inflammation). Lesions may or may not be itchy. The rate of infection is typically low in rodents, dogs, cats and rabbits raised for use in research. Ringworm can be transmitted to humans by direct contact with infected areas of skin or through contact with a contaminated object. Lesions in humans may appear as flat, spreading, ring-shaped lesions in the skin and often appear within 10-14 days of the exposure. As the lesions increase in diameter, the center often returns to a normal appearance. However, skin lesions may develop different appearances and can only be definitively diagnosed through culture or laboratory examination of the skin. Transmission of an infection can be prevented through use of appropriate personal protective equipment including gloves and protective clothing and through appropriate environmental sanitation. Infected humans are frequently treated with a topical antifungal ointment for a prolonged period. If the lesions are extensive then oral fungicides may also be used.

Additional information regarding ringworm infection can be found at:
http://www.cdc.gov/healthypets/diseases/ringworm.htm
(primates)

**SALMONELLOSIS**

Many species are susceptible to infection with bacteria within the genus *Salmonella* including guinea pigs, mice, rats, chickens, pigs, sheep, cats, rabbits, reptiles, and nonhuman primates. However, rodents and rabbits raised for use in research are very rarely infected. Infected animals may display no signs of infection or be severely affected with diarrhea, dehydration, or systemic bacterial infection.

In the laboratory environment, *Salmonella spp* may be transmitted to humans when a person ingests infected fecal material such as when a fecally contaminated glove or piece of equipment contacts a human’s mucous membranes. Infected humans may have diarrhea (with or without blood), fever, and stomach cramps. More severe signs and symptoms may develop especially in individuals with compromised immune systems. Onset of signs will usually occur 12-72 hours after infection and last for 4-7 days. In humans, infection is diagnosed through laboratory testing of a stool sample or vomitus. The practice of good personal hygiene, such as hand washing after handling animals and their environment, the use of personal protective equipment, and effective environmental sanitation are most important in preventing disease transmission to personnel. Although the disease may be treated with antimicrobials, infected individuals most frequently are provided supportive care (i.e. electrolyte replacement, intravenous fluids) until they recover.

Additional information regarding Salmonellosis can be found at:
http://www.cdc.gov/ncidod/diseases/submenus/sub_salmonella.htm

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**Shigellosis**

Shigellosis is a disease seen primarily in captive primates. It can present in many different species of primates, but it is more commonly seen in old world monkeys, such as macaques. Shigella infected animals typically present with vague symptoms such as a loss of appetite prior to developing diarrhea, and fever. Diarrhea can be seen for several days to weeks in these animals. Severely affected monkeys will have blood stained feces, straining to defecate, dehydration and progressive weakness. Morbidity is fairly low and the disease is typically curative with treatment. Some animals may become asymptomatic carriers of shigellosis and even though they show no clinical signs of disease they are still capable of carrying and shedding the bacteria.

The shigella organism can be transmitted between primates and humans fairly easily. Transmission is through the fecal-oral route. People should be aware that they may be carrying infectious material on their gloves or equipment after working with an animal with Shigellosis. The severity of disease varies among individuals and depends on the age and immune status of the person. Shigellosis is usually more severe in children and immune-compromised individuals. Disease presents 1-4 days after infection. People typically suffer from bloody diarrhea, fever, weakness, stomach cramps and
lethargy. Significant infection may require antibiotic treatment as well as fluids and electrolytes to prevent dehydration. Symptoms usually last 2-7 days, however, it may take several months before a person regains normal bowel movements. Shigellosis is easily prevented by wearing the proper PPE and practicing good hygiene.

Additional information regarding symptoms, treatment, and prevention of shigellosis can be found at: http://www.cdc.gov/nczved/divisions/dfbmd/diseases/shigellosis/

Simian Foamy Virus
Simian Foamy Virus (SFV) is a type of retrovirus seen in 70 to 90 percent of captive primates. This virus has only been identified in old world monkeys, such as macaques. Animals that are infected with simian foamy virus do not show any symptoms or illnesses, although some studies suggest that they may be at greater risk of becoming infected with other viruses.

The exact method of transmission of the virus has not been confirmed, but it is highly suspected that it is transmitted through exposure to blood, saliva, and other bodily fluids. So far there has been no reported illness in people that have tested positive for SFV. Over the 20 years that SFV has been followed in human patients no one has become ill to date. Researchers and medical doctors are still not certain about the long-term effects of SFV in humans. Retroviruses are known to have long latency periods were no clinical signs are present before illness emerges. However, so far it is suspected that the risk of long-term health effects is fairly low. This disease, while a retrovirus, has not been linked to HIV or AIDS in humans.

For additional information regarding SFV please refer to: http://www.phac-aspc.gc.ca/id-mi/sfv-vss-qa-eng.php
http://wwwnc.cdc.gov/eid/article/13/9/06-1162_article.htm

TETANUS
Tetanus (lockjaw) is an acute, often fatal disease caused by the toxin of the tetanus bacillus, Clostridium tetani. The bacterium usually enters the body in the spore form, often through a puncture wound contaminated with soil, dust, or animal feces, or through lacerations, burns, and minor unnoticed wounds. The organism is commonly found in the intestines of animals where it causes no negative effects. Humans infected through a wound or lesion frequently develop muscle rigidity and painful muscular contractions. Infection may be fatal.

All employees working with animals should be immunized against tetanus at least every ten years. All animal bite or scratch wounds should be thoroughly cleansed and evaluated by a physician.
Information regarding the recommended treatment of animal bites that occur at the University of Michigan is available at:
http://www.oseh.umich.edu/pdf/bitescratchprotocol.pdf

Additional information regarding tetanus can be found at:
http://www.cdc.gov/vaccines/vpd-vac/tetanus/default.htm

TUBERCULOSIS
*Mycobacterium spp.*, the causative agent of tuberculosis (TB), can infect a wide range of hosts. Although rare in a laboratory setting, nonhuman primates and fish are the groups of animals most likely to be infected. Infected animals may display a wide range of signs from none to sudden, unexpected death. Additional signs that may be seen in nonhuman primates include lung disease, a loss of appetite, chronic weight loss, enlarged lymph nodes, and abscesses of the skin and other organs. Tuberculosis is not a natural disease of nonhuman primates; they most frequently contract the disease from infected humans. Nonhuman primates are routinely tested to quickly detect and remove any infected animals. TB can be transmitted from animals to humans when a person ingests infected fecal material such as when a fecally contaminated glove or piece of equipment contacts a human’s mucous membranes, through breathing in infected materials, or through contact with contaminated equipment. Humans infected with TB may be asymptomatic or may exhibit chronic cough, fatigue, fever, weight loss, coughing of bloody liquid, and lung disease that may become fatal. Disease transmission to personnel is minimized through use of respiratory tract protection and good personal hygiene. TB is usually treated with antimicrobials but drug-resistant strains are increasingly being recognized.

Additional information regarding Tuberculosis can be found at:
http://www.cdc.gov/tb/faqs/default.htm

If you have had an exposure, illness symptoms, and need medical attention please refer to the information in the Bite Scratch Protocol.

Contact the UCUCA Office at 763-8028

References:
