

Non-human Primates

The following document describes common types of zoonotic illnesses encountered when working with the indicated species. This is not an exhaustive list and the possibility of zoonotic disease should be considered every time work is conducted with animals. Specific-pathogen-free status in laboratory animals tests only for the presence of particular pathogens and is NOT an assurance that the animal is pathogen-free or that it cannot transmit zoonotic diseases. PPE and experimental practices appropriate to the specific task should be followed when working with any animal species. EHS recommendations are made during review of your IACUC protocol –additional questions about the potential for zoonotic disease exposure should be directed to your EHS representative.

If you have had an exposure and/or are showing symptoms of illness, and need medical attention refer to the information in the [University of Michigan's Bite Scratch Protocol](#)

Bacterial

Disease:	LEPTOSPIROSIS
Description of Disease:	A spirochete bacteria, <i>Leptospira interrogans</i> can infect nonhuman primates. However, infection is highly unlikely in animals specifically bred and raised for use in research.
Symptoms in Animals:	Infection can result in varying symptoms across species. Nonhuman primates may exhibit blood clotting abnormalities or abortion. Icterohemorrhagic disease with abortion has been reported in squirrel monkeys.
Transmission and Symptoms in Humans:	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

Non-human Primates

	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.
Prevention:	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:	https://www.cdc.gov/leptospirosis/index.html

Disease:	SALMONELLOSIS
Description of Disease:	The most common serovars of <i>Salmonella spp.</i> isolated from nonhuman primates have all been reclassified as a subspecies of <i>S. enterica</i> .
Symptoms in Animals:	Reports of salmonella infection and disease within established primate colonies are rare. Chronic carriers and severe outbreaks have been described in recently reported cynomolgus macaques. Clinical signs include watery diarrhea with or without blood, fever, neonatal septicemia, abortion, osteomyelitis, and pyelonephritis.
Transmission and Treatment in Humans:	In the laboratory environment, <i>Salmonella spp</i> may be transmitted to humans when a person ingests infected fecal material or has contact with fomites. 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 6 hours to 6 days after infection and last for 4-7 days. In humans, infection is diagnosed through laboratory testing of a stool sample or vomitus.
Prevention:	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.

Nonhuman Primates Zoonotic Disease Risks

2June 2020

Non-human Primates

Additional information:	https://www.cdc.gov/salmonella/index.html
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Disease:	Shigellosis
Description of Disease:	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 and baboons.
Symptoms in Animals:	Shigellosis can commonly present as a subacute infection or a chronic, intermittent diarrhea in colonies with enzootic infections. Severely affected monkeys will have blood stained feces, straining to defecate that may progress to rectal prolapse, dehydration, and progressive weakness. Some animals, up to 20-25%, may become asymptomatic carriers of shigellosis and are capable of carrying and shedding the bacteria.
Transmission and Symptoms in Humans:	The shigella organism can be transmitted between primates and humans fairly easily. Transmission is through the fecal-oral route or by direct contact with infected animals. 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 and may be fatal in children and immune-compromised individuals. Disease presents 1-2 days after infection. People typically suffer from bloody diarrhea, fever, weakness, stomach cramps and lethargy and should contact their healthcare provider. Symptoms usually last 5-7 days, however, it may take several months before a person regains normal bowel movements.
Prevention:	Shigellosis is easily prevented by wearing the proper PPE and practicing good hygiene, especially when working with newly arrived primates or primates in quarantine.
Additional Information:	https://www.cdc.gov/shigella/index.html

Non-human Primates

Disease:	TETANUS
Description of Disease:	Tetanus (lockjaw) is an acute, often fatal disease caused by the toxin of the tetanus bacillus, <i>Clostridium tetani</i> . 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.
Symptoms in Animals:	The organism is commonly found in the intestines of animals where it causes no negative effects.
Transmission and Symptoms in Humans:	Humans infected through a wound or lesion frequently develop muscle rigidity and painful muscular contractions. Infection may be fatal.
Prevention:	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.
Additional Information:	https://www.cdc.gov/tetanus/index.html

Disease:	TUBERCULOSIS
Description of Disease:	<i>Mycobacterium spp.</i> , the causative agent of tuberculosis (TB), can infect a wide range of hosts. Although rare in a laboratory setting, outbreaks of tuberculosis still occur, particularly in Old World species. The disease is often contracted in the wild through human contact and then transmitted from monkey to monkey.
Symptoms in Animals:	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 (cough and/or trouble breathing), a loss of appetite, chronic weight loss, enlarged lymph nodes, and abscesses of the skin and other organs.

Nonhuman Primates Zoonotic Disease Risks

4 June 2020

Non-human Primates

Transmission and Symptoms in Humans:	TB is usually transmitted by airborne infectious particles, but can also be contracted by direct ingestion of bacteria. Laboratory workers have a high risk of contracting the disease when caring for or performing autopsies on infected animals. The organism can also be found in dusty bedding or the cough of infected animals and can become aerosolized during high-pressure water sanitization. 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.
Prevention:	Nonhuman primates are routinely tested and any infected animals should be promptly removed. Disease transmission to personnel is minimized through use of respiratory tract protection and good personal hygiene.
Additional Information:	https://www.cdc.gov/tb/default.htm

Viral

Disease:	HERPES B VIRUS
Description of Disease:	Herpes B virus (macaque herpesvirus 1) is a common virus infecting macaque monkeys, including rhesus macaques and macaque-derived cell cultures. Baboons are not known to be naturally infected.
Symptoms in Animals:	Infected macaques are usually asymptomatic. However, 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.
Transmission and Treatment in Humans:	Shedding of the virus may or may not be associated with clinical signs. Herpes B virus can be transmitted from infected macaques to humans through bites, animal scratches, scratches from contaminated equipment, needle-stick injuries,

Non-human Primates

	<p>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.</p>
Prevention:	<p>With the use of appropriate precautions, such as PPE and safe animal handling procedures, 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. Prompt evaluation and follow-up care by a medical professional should be initiated.</p>
Additional information:	<p>https://www.cdc.gov/herpesvirus/index.html</p>

Disease:	Simian Foamy Virus
Description of Disease:	<p>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.</p>
Symptoms in Animals:	<p>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.</p>
Transmission and Symptoms in Humans:	<p>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</p>

Nonhuman Primates Zoonotic Disease Risks

6 June 2020

Non-human Primates

	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.
Prevention:	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.
Additional Information:	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

Fungal

Disease:	RINGWORM (DERMATOPHYTOSIS)
Description of Disease:	Ringworm is a fungal infection that occurs rarely in nonhuman primates by organisms of the genera <i>Microsporum</i> and <i>Trichophyton</i> . The organism can persist in the environment for extended periods of time.
Symptoms in Animals:	Infected animals may not exhibit any signs of infection or may develop areas of alopecia (hairloss) and erythema (redness/inflammation). Animals may be seen scratching lesions The rate of infection is typically low in animals raised for use in research.
Transmission and Treatment in Humans:	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

Non-human Primates

	may develop different appearances and can only be definitively diagnosed through culture or laboratory examination of the skin.
Prevention:	Transmission of an infection can be prevented through use of appropriate personal protective equipment including gloves and protective clothing and through appropriate environmental sanitation.
Additional information:	https://www.cdc.gov/fungal/diseases/ringworm/index.html http://www.nlm.nih.gov/medlineplus/ency/article/001439.htm

Protozoa

Disease:	CRYPTOSPORIDIOSIS
Description of Disease:	<i>Cryptosporidium parvum</i> is a protozoal parasite that has been described in both New and Old World primates. The organism survives well in the environment and may survive in water for prolonged periods.
Symptoms in Animals:	Clinical disease can be mild and go unrecognized in primates. Severe disease is seen in rare instances and can include protracted diarrhea, anorexia, and weight loss.
Transmission and Treatment in Humans:	The organism is most frequently transmitted by ingestion of contaminated materials but may also be transmitted by aerosols. 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 between 2-10 days after exposure. In otherwise healthy individuals, the illness is usually self-limiting (1 to 2 weeks). However, a more severe and chronic disease may develop in immunocompromised patients.
Prevention:	Transmission of the disease can be prevented through utilization of good personal hygiene and by wearing personal

Non-human Primates

	protective equipment especially when working with young animals with diarrhea.
Additional information:	http://www.cdc.gov/parasites/crypto/

Disease:	GIARDIASIS
Description of Disease:	Numerous mammals including dogs, cats, nonhuman primates, pigs, sheep, and goats, can all be natural hosts for giardia, a protozoan organism. However, due to the strictly controlled environment in which the animals are raised, natural infection is unlikely.
Symptoms in Animals:	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.
Transmission and Treatment in Humans:	Giardia infection is transmitted to humans when a person ingests infected fecal material. Infected humans may develop diarrhea, greasy stools, abdominal cramps, nausea/vomiting, and dehydration. These signs appear approximately 7-10 days after infection and can last for 1-2 weeks or longer. Infection is diagnosed by testing of a stool sample.
Prevention:	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.
Additional information:	https://www.cdc.gov/parasites/giardia/index.html

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Non-human Primates

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