

An Introduction to Zoonotic Diseases Of Rodents

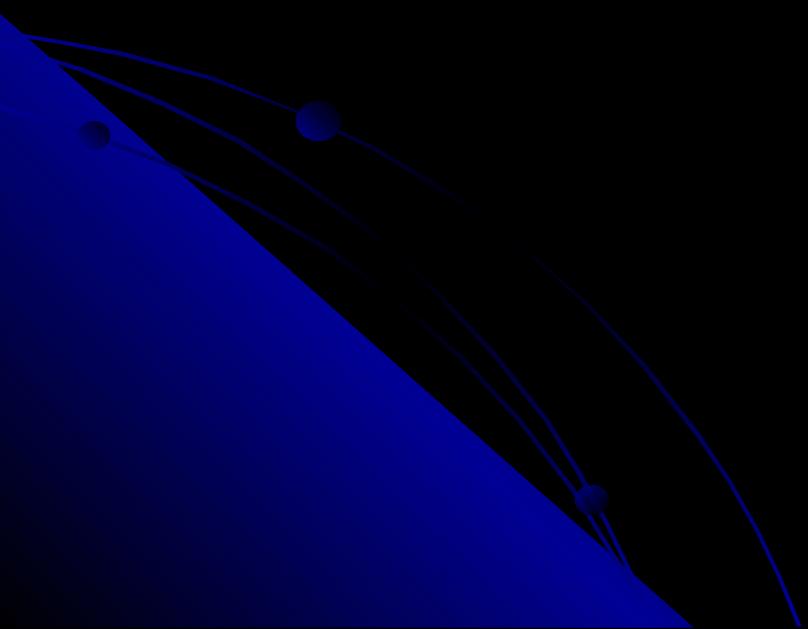


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What is a Zoonotic disease?

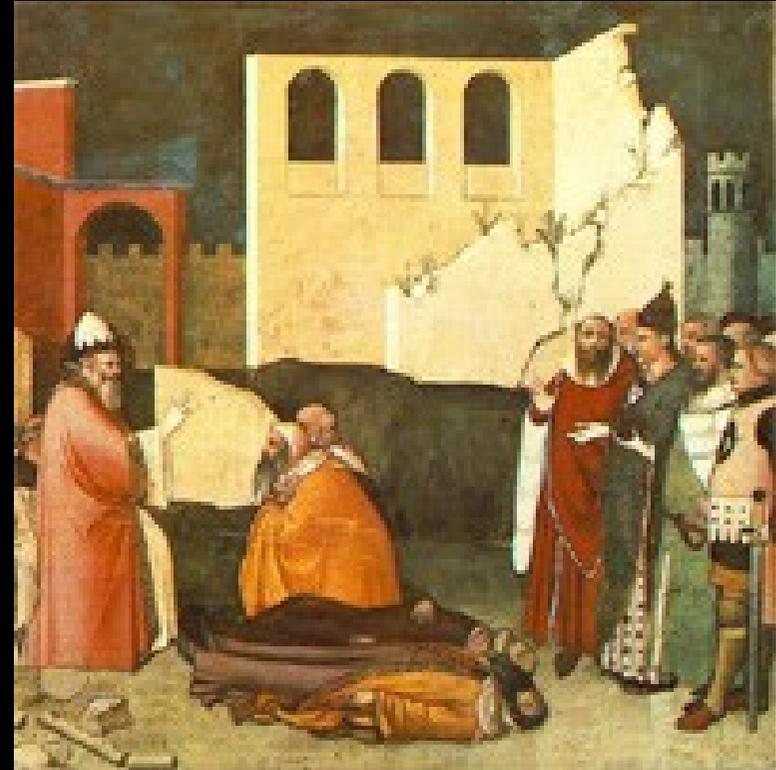


- A zoonotic disease is one that can be transmitted from animals to humans or from humans to animals. (1)



What are some of the more famous zoonotic diseases?

- Possibly the most well know zoonotic disease in history is the Plague or “Black Death”. Associated with rodents and other mammalian species, this disease cost Europe a third of its population in the 14th and 15th century. It continues to be a threat to the health of humans and animals in the western United States and throughout the world. (2)



painting taken from:
http://www.brown.edu/Departments/Italian_Studies/dweb/plague/index.shtml

What Zoonotic Diseases Will We Cover?

- We will cover some of the more prominent zoonotic diseases of rodents:
- LCMV (Lymphocytic Choriomeningitis Virus)
- Salmonellosis
- Rat Bite Fever
- Hantavirus
- Plague
- Leptospirosis
- Monkey Pox

With each disease we will attempt to answer the following questions:

- What is it?
- What animals can transmit it to humans?
- How do I get it?
- What are the symptoms?
- What precautions can I take to avoid getting it?



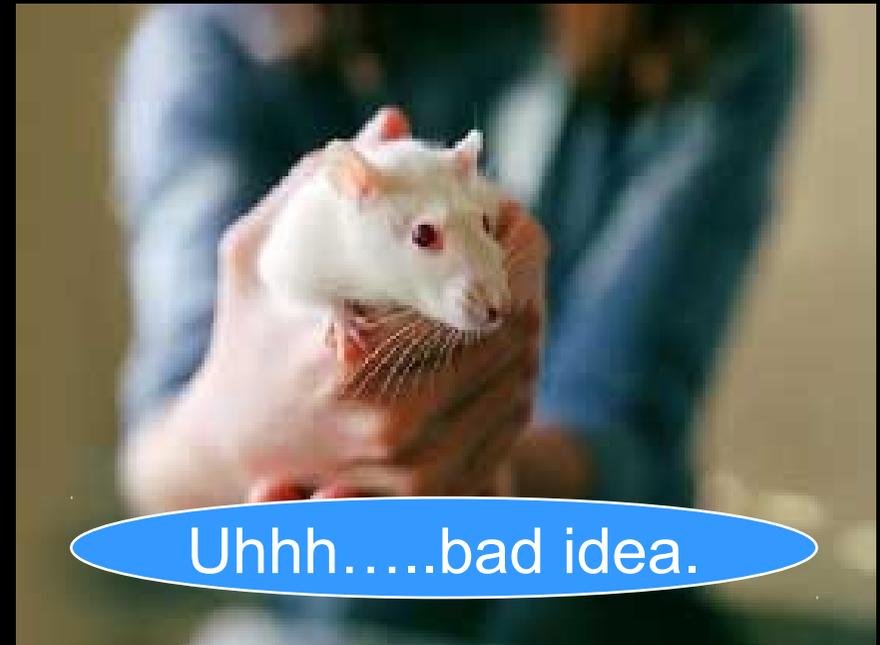
Something to Keep in Mind

- Because commercial animal suppliers as well as institutional QA departments often perform extensive screening for these agents, you are much more likely to encounter these diseases outside of the animal facility. Therefore many of the preventative measures mentioned in this training speak more to pet ownership and wildlife.



Something to keep in mind

- However, new diseases can always be discovered and new strains of transgenic/knockout mice may be immunosuppressed and therefore more sensitive to disease. Therefore, **PPE should always be properly worn to protect both people and animals.**



Uhhh.....bad idea.

Lymphocytic Choriomeningitis Virus (LCMV)

- What is it?
- Lymphocytic choriomeningitis, or LCM, is a rodent-borne viral infectious disease. (1)
- It is the primary viral infection of laboratory mice from which humans can contract severe illness. (28)

LCMV (Lymphocytic Choriomeningitis Virus)

- What animals can transmit it to humans?

The primary host of LCMV is the common house mouse (*Mus musculus*).
(5)



photo taken from:http://en.wikipedia.org/wiki/Mus_musculus

LCMV – What animals carry it?

- LCMV is not normally found in pet rodents, such as hamsters, gerbils, and guinea pigs. However, pet rodents can become infected after being in contact with wild house mice in breeding facilities, pet stores, or homes. People have become infected from contact with LCMV-infected hamsters. (5)



photo taken from AALAS Learning Library

How Are We Exposed?

- Humans can develop LCMV infection from exposure to urine, droppings, saliva, or nesting material of infected rodents. LCMV infection can also occur when these materials are inhaled or directly introduced into broken skin or into the nose, eyes, or mouth, and possibly by a bite from an infected animal. (5)

How is LCMV contracted?

- LCMV utilizes numerous cell lines as laboratory hosts , including transplantable tumor lines and tissue culture cell lines. (27)
- Our QAL does screen all cell lines here, however this is still a possible means for LCMV to infect our animals.

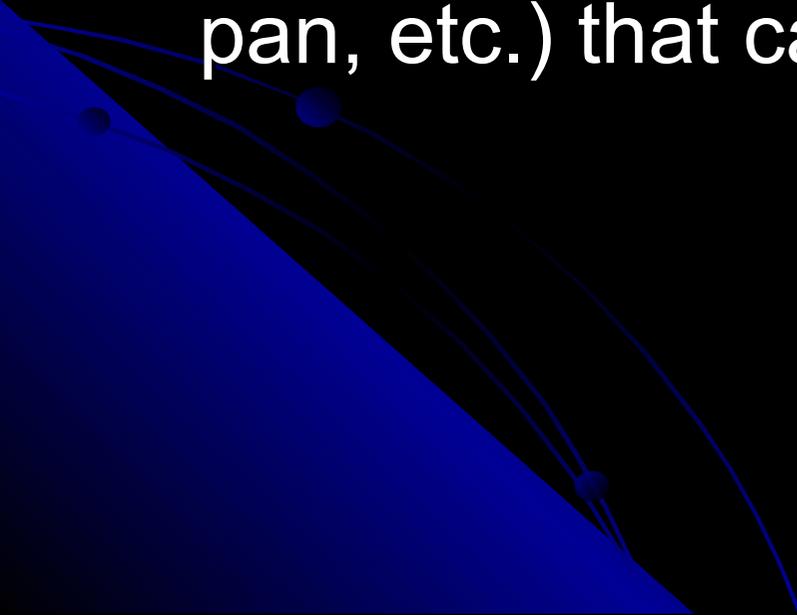
How is LCMV Contracted?

- Infected mice shed LCMV into feces, saliva, nasal secretions, and urine. Moreover, their high-titer viruria (presence of virus in urine) may transform used bedding and other materials into highly infectious fomites.(29)

Vector vs Fomite

- What is a vector?
- What is a fomite?



- Vector – a living thing that can transmit a disease
 - Fomite – an inanimate object (bedding, dust pan, etc.) that can transmit a disease
- 

What does that mean?

- It means that if there is fomite transmission, it's not just the person who touches or handles the animal that is at risk. Anyone who is handling objects that come in contact with the infected animal is also at risk.
- Therefore, if fomite transmission exists, you are at risk if you dump the bedding of infected animals.
- So...PPE, PPE, PPE!!!!

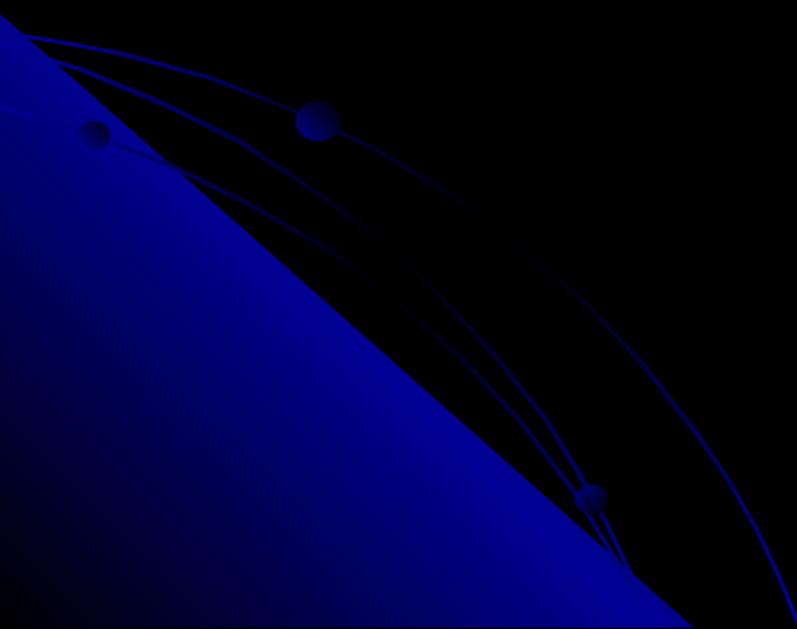
How is LCMV contracted?

- A pregnant woman who becomes infected can pass the LCMV infection to her unborn baby; in addition, LCMV can be spread through organs transplanted from an infected donor. With the exception of these situations, there is no documented evidence of person-to-person transmission. (5)



What are the symptoms of LCMV?

- Although infection with the virus is not uncommon (about 5% of the general population has been exposed to it), it is rare for people to actually become ill from LCMV. (6)



What are the symptoms of LCMV?

- Adults with normal immune systems can be infected with LCMV without symptoms, or they may develop a mild illness with symptoms that may include the following: fever, lack of appetite, muscle aches, headache, chills, nausea, and vomiting. (5)

What are the symptoms of LCMV?

- People with weakened immune systems may have more severe or fatal illness when infected with LCMV.
- Women who become infected with LCMV during pregnancy may have spontaneous abortion, or their baby may have severe birth defects, including congenital hydrocephalus (fluid on the brain), chorioretinitis (inflammation of the eye), blindness, or mental retardation. (5)

Symptoms in Hamsters

- The early signs of LCMV infection in a hamster include
 - loss of activity
 - loss of appetite
 - rough coat.
- Later, the animal may show signs of weight loss, hunched posture, inflammation of the eye lids, and eventually death. This can take several weeks or months.
- Or, they may show no signs at all.

LCMV in the News

- In the spring of 2005, LCMV was determined to be the cause of three deaths in recipients of organ transplants, all of whom had received organs from the same donor. LCMV was later found in the organ donor's pet hamster. (6)

What precautions can be taken to avoid contracting LCMV?

- **Wash hands thoroughly with soap and water** after handling pet rodents or cleaning up pet droppings, cages, or areas where pets have been. (6)



Precautions - LCMV

- Young children should be closely supervised when cleaning cages or handling rodents. They should be supervised or assisted in washing their hands immediately after handling rodents and rodent cages or bedding.
(6)



Precautions - LCMV

- Pet rodents should never be kissed or held close to the face.
- Pet rodents should always be supervised when not in their cages, and should not be allowed to come in contact with wild rodents or their droppings or nests.

Precautions - LCMV

- Cages should be cleaned in a well-ventilated area or outside. Wear rubber, latex, vinyl or nitrile gloves and wash hands thoroughly when you are done. Once the cage is clean of organic material, wash it with a dilute bleach solution (one and one-half cups of bleach to one gallon of water).



Precautions - LCMV

- **Pregnant women or persons with a weakened immune system are at higher risk of more serious disease if they do become infected with LCMV. (6)**



Precautions - LCMV

- **Pregnant women and those with weakened immune systems should seriously consider not owning a pet rodent.** If they do have pet rodents, such persons, at a minimum, should avoid prolonged stays in the room where the rodent resides, keep the animal in a separate part of the home, and ask someone else to clean the cage and care for the animal.

(6)

Precautions - LCMV

- Follow common practices for mouse-proofing your house. Because the common house mouse is the primary host, keep them out of your home.
- If purchasing a pet rodent, look out for animals that look sick or show LCMV symptoms. If symptoms are observed, avoid buying a pet from that store.

Question 1

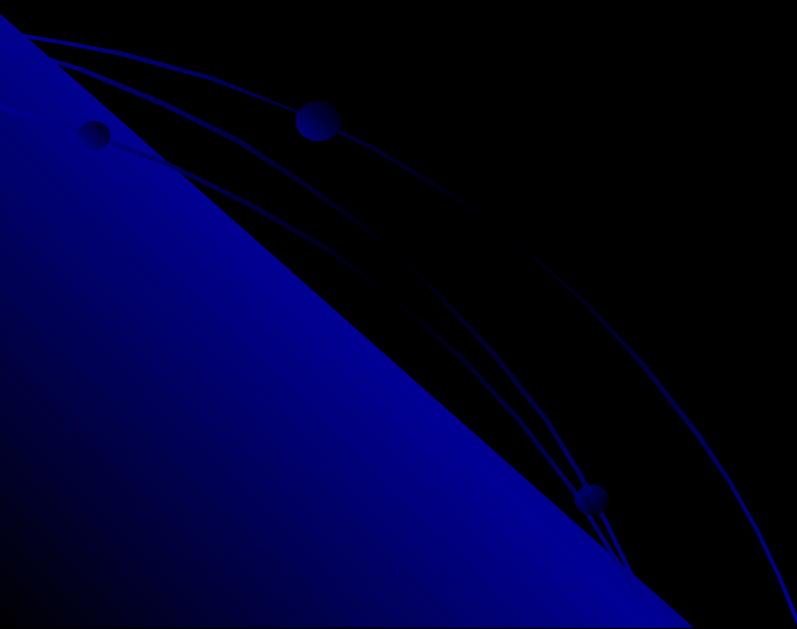
- What is a fomite? What are some examples of a fomite?
- 

Answer

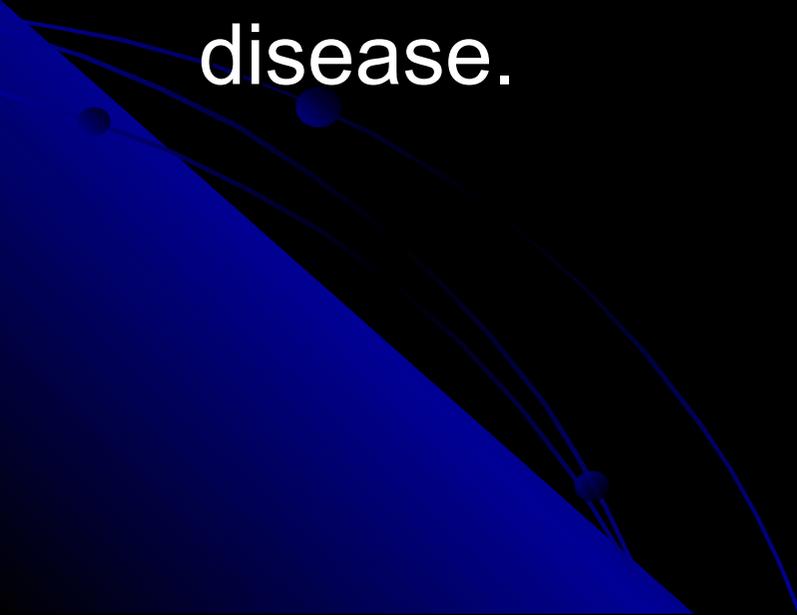
- A fomite is an inanimate object that can transmit a disease. Examples _____

Question 2

- What is a vector?

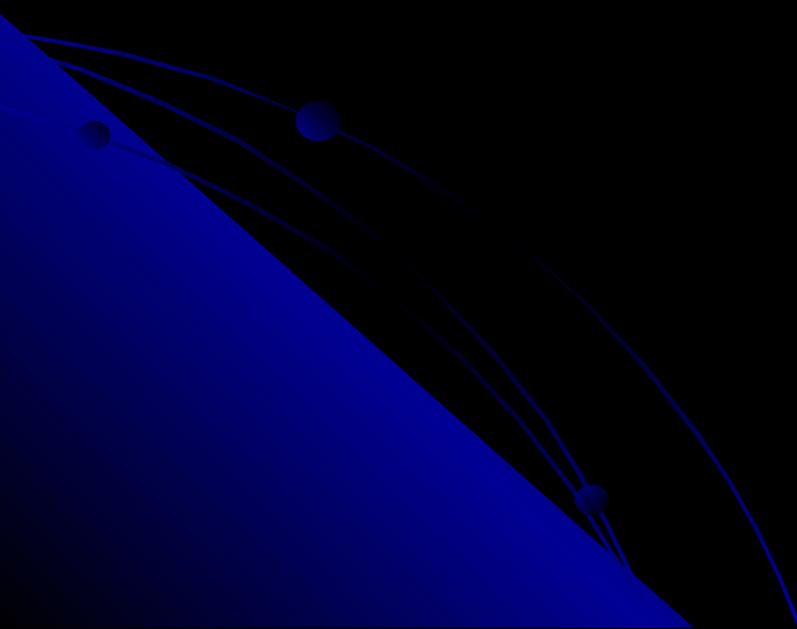


Answer

- A vector is a living thing that can transmit a disease.
- 

Question 3

- Who may be particularly sensitive and severely affected by the harmful symptoms of LCMV?



Answer

- Pregnant women and immunocompromised people.



Salmonellosis

- What is it?
- Salmonellosis is an infection with a bacteria called Salmonella.
- Salmonella is most commonly associated with insufficient hygiene or inadequately cooked food during food preparation. For the purposes of this training, we will focus more on its acquisition from pets.

What animals can transmit Salmonellosis to humans?

- Salmonella may be found in the feces of some pets, especially those with diarrhea.
- Reptiles are particularly likely to harbor Salmonella. (7)
- Pet turtles are a primary source of salmonella. For this reason the little red slider turtles can no longer be bought.
- In addition to reptiles, salmonellosis outbreaks have been reported after handling of pet chicks, ducklings, kittens, and hedgehogs (10).

Salmonellosis and rodents:

- Recent findings demonstrate that the handling of pet rodents is a potential health risk, especially for children. (10)



Salmonellosis - Rodents

- Case Reports:
- **South Carolina.** During June 2004, a boy aged 4 years was hospitalized for 5 days with fever (105°F [40.6°C]), watery diarrhea, and abdominal cramping. A stool culture yielded *S. Typhimurium*. Nine days before the boy's illness, his family had purchased a hamster from a retail pet store supplied by an Arkansas distributor; the hamster was found dead 2 days after purchase. (10)

Salmonellosis - Rodents

- **Minnesota.** During August 2004, a boy aged 5 years had diarrhea of 14 days' duration (initially bloody), abdominal cramps, vomiting, and fever (103°F [39.4°C]). A stool culture yielded *S. Typhimurium*. Four days before the boy became ill, his family had purchased a mouse from a retail pet store supplied by a Minnesota distributor. The mouse became lethargic and had diarrhea immediately after purchase. Even though the mouse was ill, the boy frequently handled and kissed the mouse. One week after purchase, the mouse died. Cultures of the mouse's lungs, pooled liver and spleen, and intestines yielded growth of *S. Typhimurium*. (10)

Salmonellosis – How is it contracted?

- Salmonella may be found in the feces of some pets, especially those with diarrhea, and people can become infected if they do not wash their hands after contact with these feces. (7)

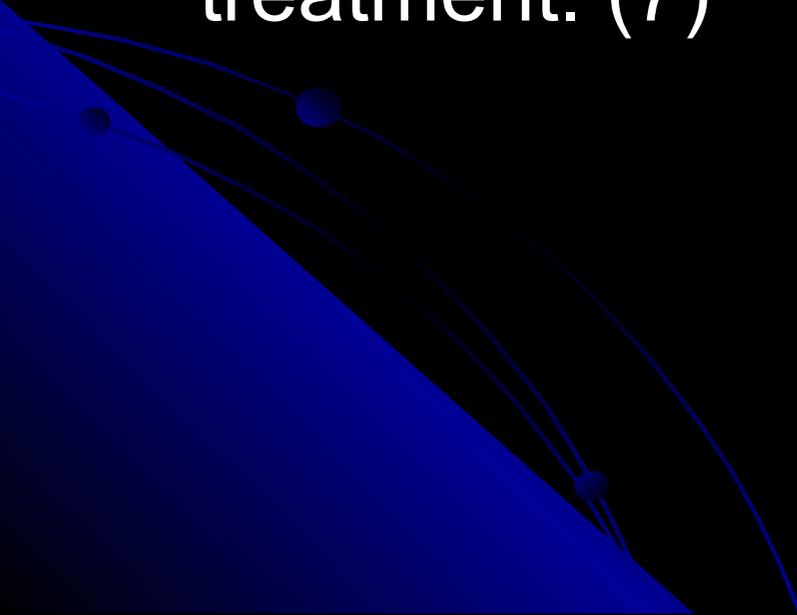


Salmonellosis – How do I get it?

- Handling of infected animals is a possible means of transmission.



Salmonellosis - Symptoms

- Most persons infected with *Salmonella* develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. The illness usually lasts 4 to 7 days, and most persons recover without treatment. (7)
- 

Salmonellosis - Symptoms

- In some persons the diarrhea may be so severe that the patient needs to be hospitalized. In these patients, the *Salmonella* infection may spread from the intestines to the blood stream, and then to other body sites and can cause death unless the person is treated promptly with antibiotics. The elderly, infants, and those with impaired immune systems are more likely to have a severe illness. (7)

Salmonellosis – Preventative Measures

- Expect rodent feces to be potentially infectious.
- Thoroughly wash hands with soap and water after handling rodents or their cages or bedding.
- Wear gloves when handling or cleaning up after animals.
- Young children who are unable to reliably wash their hands should avoid contact with rodent feces. (8)

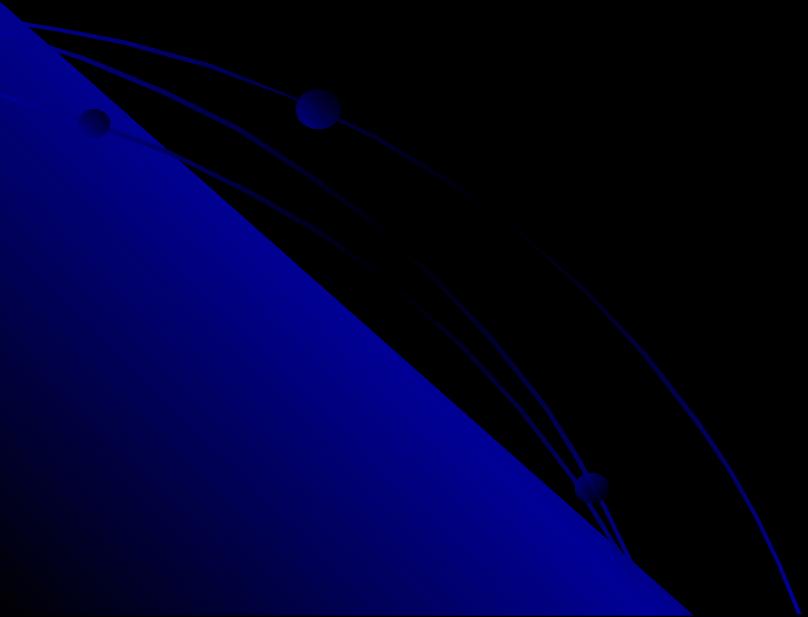


Question 1

- What reptile is considered a primary source of salmonella?

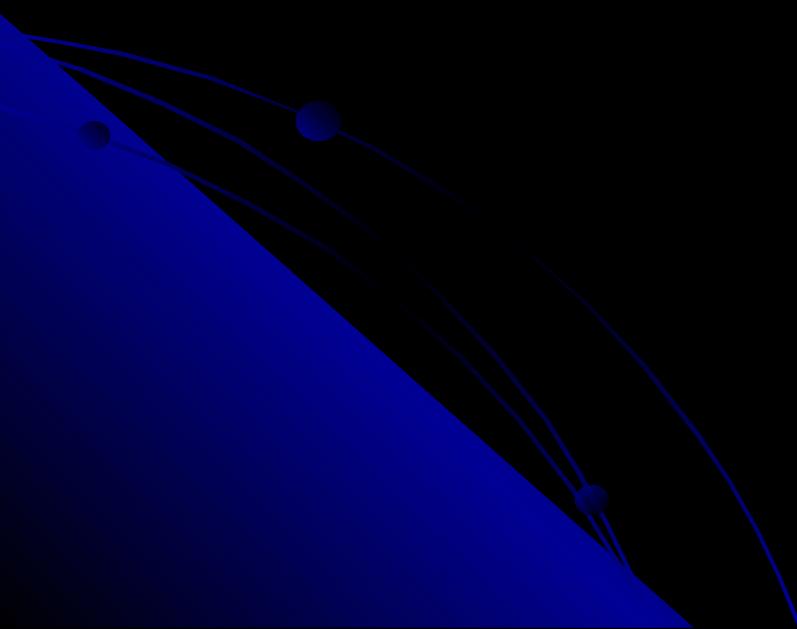
Answer

- Pet turtles



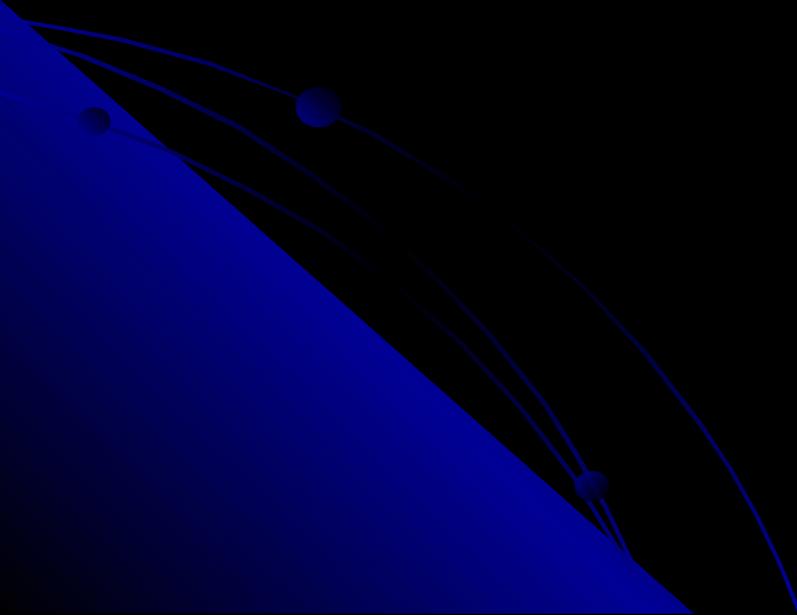
Question 2

- Can salmonellosis be contracted by simply handling an infected animal?



Answer

• Yep

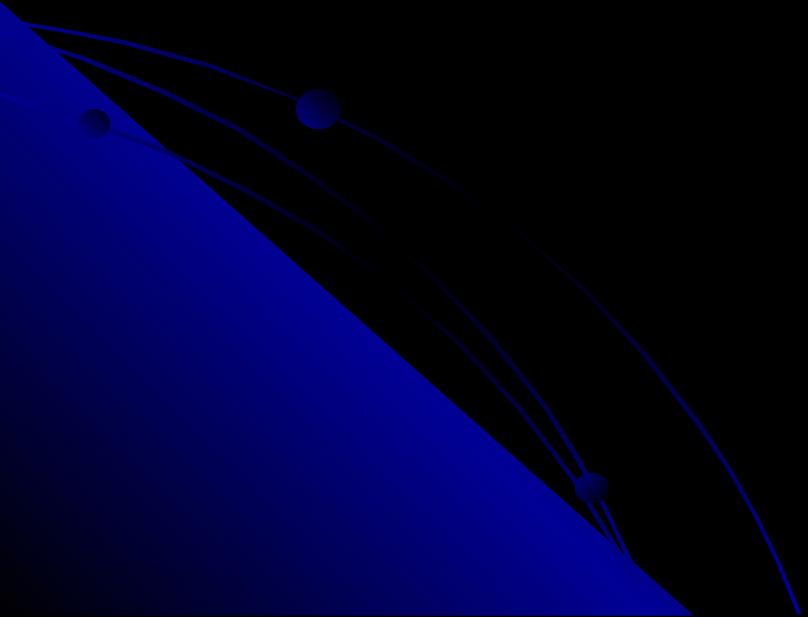
A blue shaded area in the bottom-left corner of the slide. Three curved lines originate from the blue area and extend towards the right. The topmost line has a blue dot on it. The middle line has a smaller blue dot. The bottom line has a very small blue dot.

Question

- Which particular age group should be closely watched when handling animals?
- 

Answer

- Children



Rat Bite Fever

- What is it?
- Rat Bite Fever is a disease condition caused by microorganisms (a bacteria called streptobacillus) present in the upper respiratory tracts and oral cavities of asymptomatic rodents, especially rats. (9)

Rat Bite Fever

- What animal can transmit Rat Bite Fever to humans?
- The name says it all: primarily rats



How do humans contract Rat Bite Fever?

- Human infection can result from a bite or scratch from an infected or colonized rat, handling of an infected rat, or ingestion of food or water contaminated with infected rat excreta. (9)
- 

What are the symptoms of Rat Bite Fever?

- An abrupt onset of fever, myalgias (muscle pain), arthralgias (joint pain), vomiting, and headache typically occurs within 2--10 days of exposure and is usually followed by a maculopapular rash on the extremities.
- RBF has a case-fatality rate of 7%--10% among untreated patients. (9)



Maculopapular rash

Recent Cases

- Two cases of fatal Rat Bite Fever occurred 2003.
- One case occurred in Florida and the other in Washington state.
- Both cases involved previously healthy individuals.
- In one case, the patient was a pet store worker who had experienced a rat bite.
- The other case involved a patient who had nine pet rats, but no known animal bites in the previous two weeks.(9)

Preventing Rat Bite Fever Infection

- Wear protective gloves, practice regular hand washing, and avoid hand-to-mouth contact when handling rats or cleaning rat cages
- Adults should closely supervise children aged <5 years to prevent bites and hand-to-mouth contact.
- If bitten by a rat, promptly clean and disinfect the wound.
- **Report any bite wound that occurs to Debbie or Maureen!**

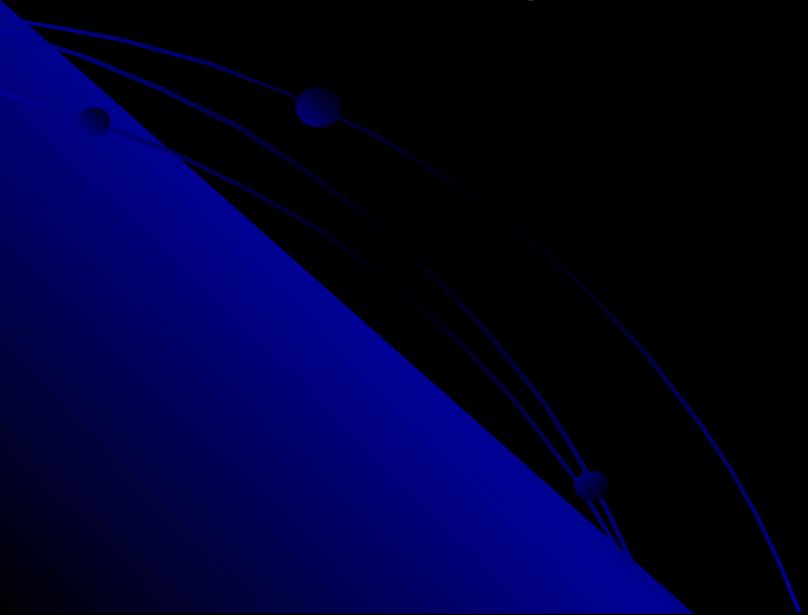
Question 1

- Will rats that can give you rat bite fever show any signs of symptoms?



Answer

- No – they are asymptomatic

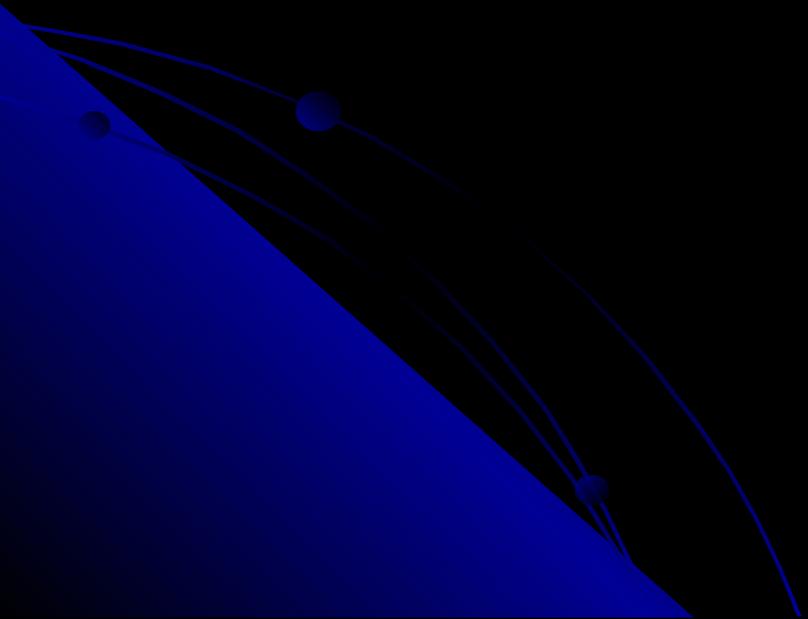


Question 2

- What percent of untreated people who have contracted Rat Bite Fever die?
- 

Answer

- 7-10%



Hantavirus Pulmonary Syndrome (HPS)

- What is it?
- Hantavirus pulmonary syndrome (HPS) is a deadly disease (caused by a virus) transmitted by infected rodents. HPS was first recognized in 1993 and has since been identified throughout the United States. (12)

How HPS Came to be Known to the Public

- An outbreak of unexplained illness occurred in May 1993 in the "Four Corners," an area of the Southwest shared by New Mexico, Arizona, Colorado, and Utah. A number of previously healthy young adults suddenly developed acute respiratory symptoms; about half soon died. (13)

What animals can transmit HPS?

Found Throughout
North America



Primary reservoir for Hantavirus!

Deer Mouse

Southeastern U.S.



Cotton Rat

Southeastern U.S.



Rice Rat

Southern New England,
Mid-Atlantic and southern states,
Mid-Western and western states



White Footed Mouse

**Distribution* of *Peromyscus maniculatus* and
Location of HPS Cases as of July 6, 2005
Total Cases (N=396 in 30 States)**



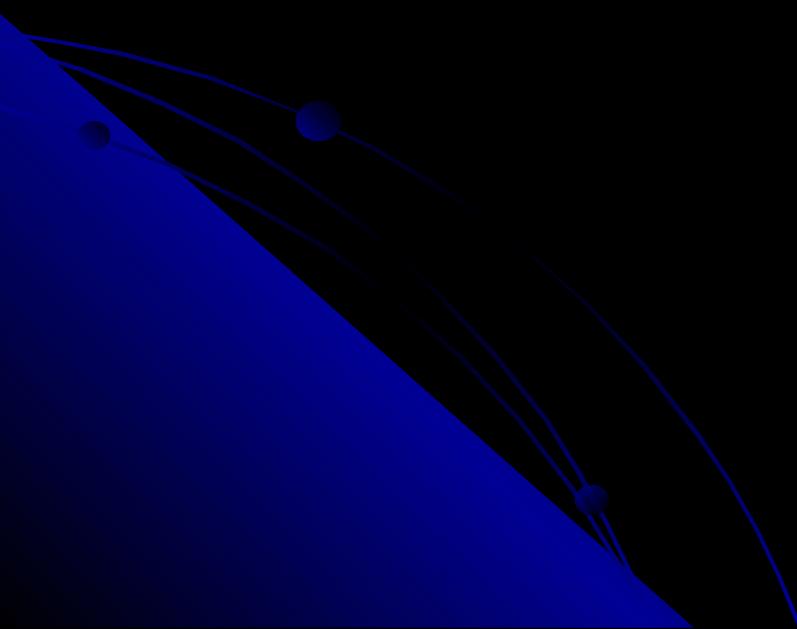
*Rodent distributions from: Burt VH, Grossenheider RP. A Field Guide to the Mammals. 3rd ed. New York, New York. Houghton Mifflin Company. 1980

How is HPS Transmitted?

- Hantavirus is transmitted by infected rodents through urine, droppings, or saliva. Individuals become infected with HPS after breathing fresh aerosolized urine, droppings, saliva, or nesting materials. Transmission can also occur when these materials are directly introduced into broken skin, the nose or the mouth. If a rodent with the virus bites someone, the virus may be spread to that person, but this type of transmission is rare. (14)

How is HPS Transmitted?

- In most cases, infections occurred when rodent infested buildings were swept or cleaned out.



Early Symptoms

Early symptoms include fatigue, fever and muscle aches, especially in the large muscle groups-thighs, hips, back, and sometimes shoulders. These symptoms are universal.

There may also be headaches, dizziness, chills, and abdominal problems, such as nausea, vomiting, diarrhea, and abdominal pain. About half of all HPS patients experience these symptoms.

(15)

Late symptoms

- Four to 10 days after the initial phase of illness, the late symptoms of HPS appear. These include coughing and shortness of breath, with the sensation of, as one survivor put it, a "...tight band around my chest and a pillow over my face" as the lungs fill with fluid.

(15)

HPS Symptoms - Treatment

- There is no specific treatment, cure, or vaccine for hantavirus infection. However, we do know that if infected individuals are recognized early and receive medical care in an intensive care unit, they may do better. In intensive care, patients are intubated and given oxygen therapy to help them through the period of severe respiratory distress.

(16)

HPS Symptoms - Treatment

- The earlier the patient is brought in to intensive care, the better. If a patient is experiencing full distress, it is less likely the treatment will be effective.

Therefore, if you have been around rodents and have symptoms of fever, deep muscle aches, and severe shortness of breath, see your doctor immediately. Be sure to tell your doctor that you have been around rodents-this will alert your physician to look closely for any rodent-carried disease, such as HPS. (16)

Hantavirus Pulmonary Syndrome, United States Descriptive Demographic Statistics, July 6, 2005

| Characteristics | Total |
|------------------------|---------------------|
| | N 396 (100%) |
| Gender | |
| Male | 247 (62%) |
| Female | 149 (38%) |
| Race | |
| White | 305 (77%) |
| American Indian | 76 (19%) |
| Black | 6 (2%) |
| Asian | 3 (1%) |
| Ethnicity | |
| Hispanic | 52 (13%) |
| Case Fatality | |
| Dead | 142 (36%) |
| Age (years) | Mean=38 [10-83] |

HPS

Recent Cases

- Two cases of Hantavirus Pulmonary Syndrome (HPS) were reported in Randolph County, West Virginia in July of 2004.
- One case was fatal and involved a graduate student who spent the previous month trapping small mammals and handling mice daily.
- The other case involved a patient who had spent a weekend at a mouse infested cabin. In this case the patient became very ill, but did survive. (17)

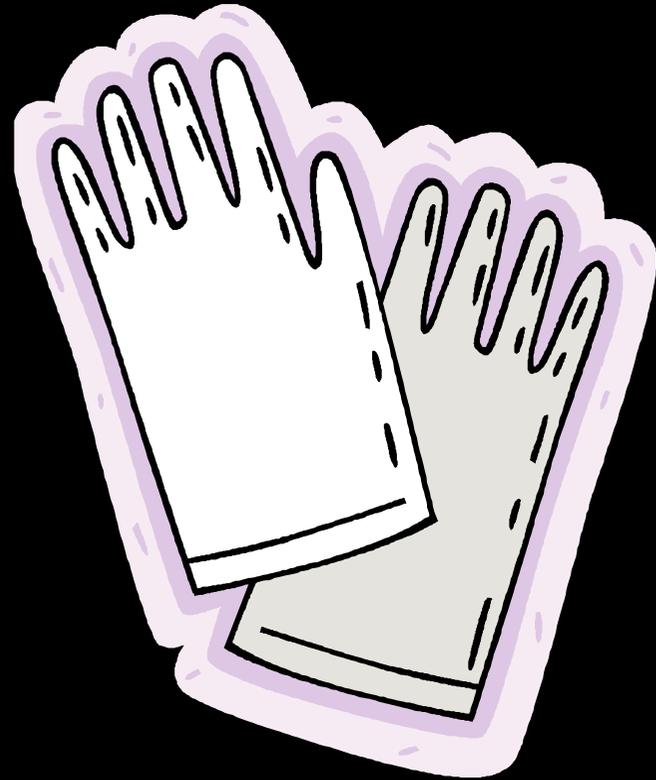
HPS Prevention/Precautions

- Safely clean up rodent-infested areas
- Air out infested spaces before cleanup
- Spray areas of infestation and all excreta, nesting, and other materials with household disinfectant or 10% bleach solution then clean up, seal in bags, and dispose. (21)

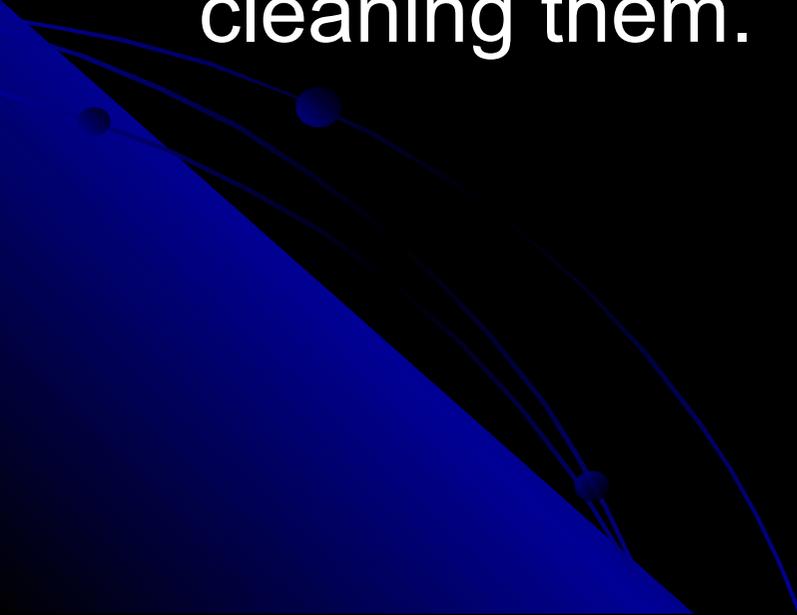


HPS Prevention/Precautions

- Avoid sweeping, vacuuming, or stirring dust until the area is thoroughly wet with disinfectant.
- Wear rubber gloves; disinfect gloves before removal, and wash hands afterwards. (21)



HPS Prevention/Precautions

- When cleaning potentially rodent infested areas, wear a mask.
 - To limit dust particles from being stirred up, wet down potentially rodent infested areas prior to cleaning them.
- 

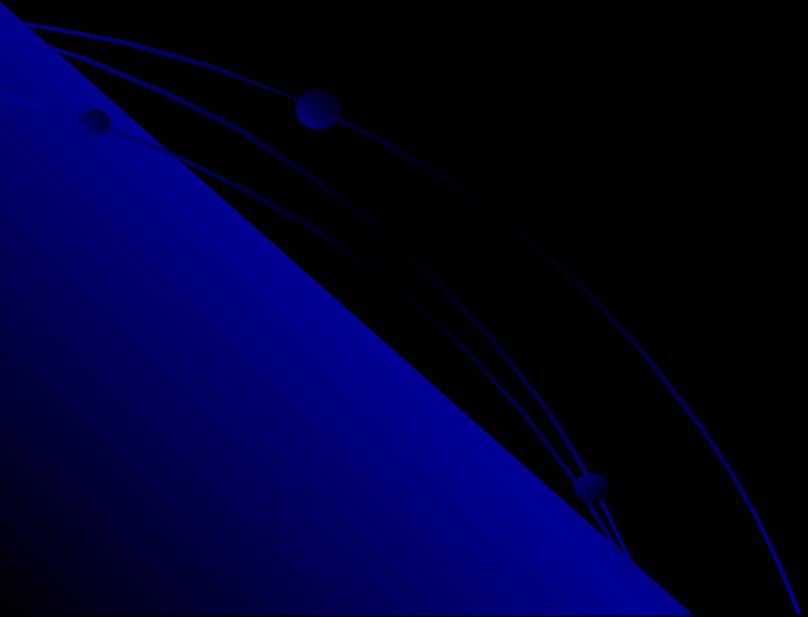
Question 1

- In the U.S. which animal is considered to be the primary reservoir for hantavirus?

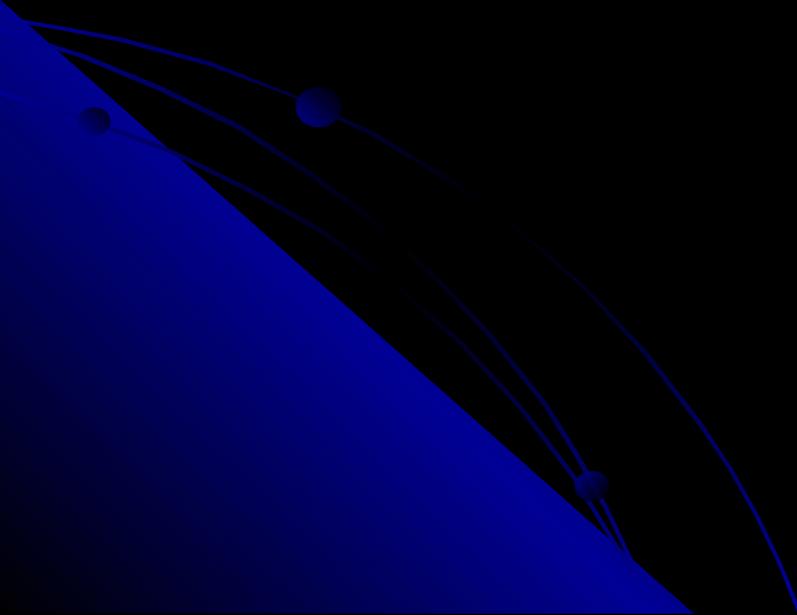


Answer

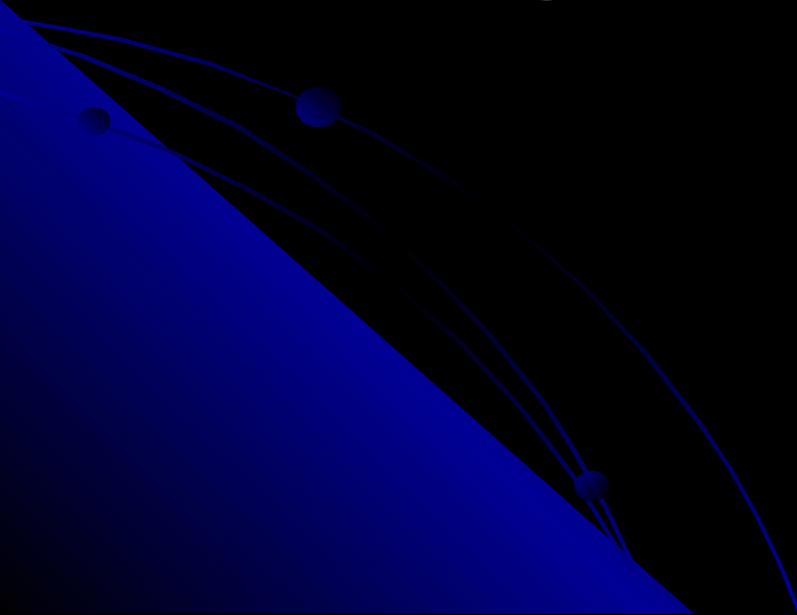
- The deer mouse



Question 2

- In most reported case of HPS, what activity had the infected patient participated in ?
- 

Answer

- Sweeping out/cleaning a rodent infested area
- 

Question 3

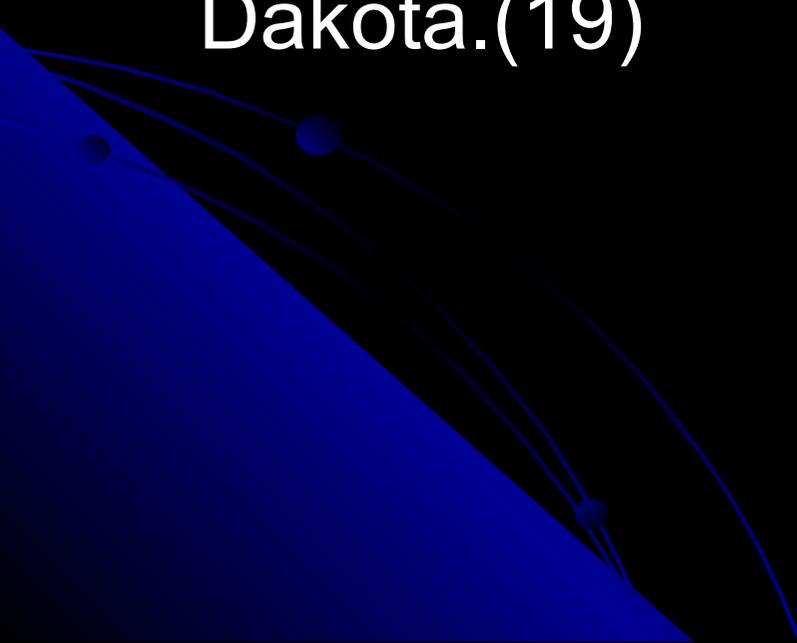
- List some preventative measures that can be taken to minimize contracting HPS
- 

Plague

- What is it?
- Plague is an infectious disease of animals and humans caused by a bacterium named *Yersinia pestis*. (18)
- Between 5 and 15 cases are reported each year in the United States.
- Plague is a seasonal disease, with most reported human cases occurring between March and October.(19)



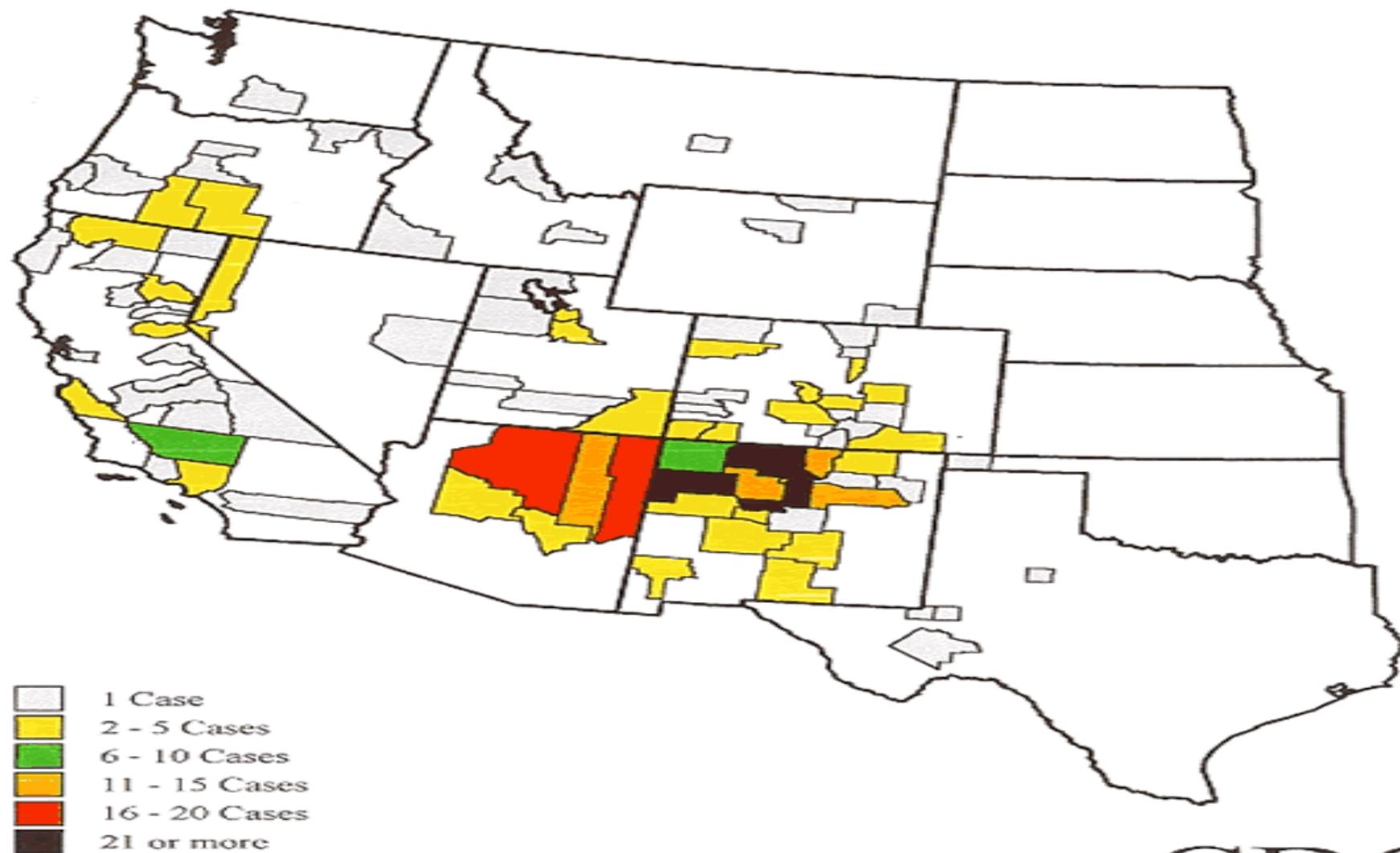
What and Where?

- *Yersinia pestis* is endemic to the western half of the United States and has been isolated as far east as Dallas and the western edges of Kansas, Nebraska, Oklahoma, And South Dakota.(19)
- 

What and Where?

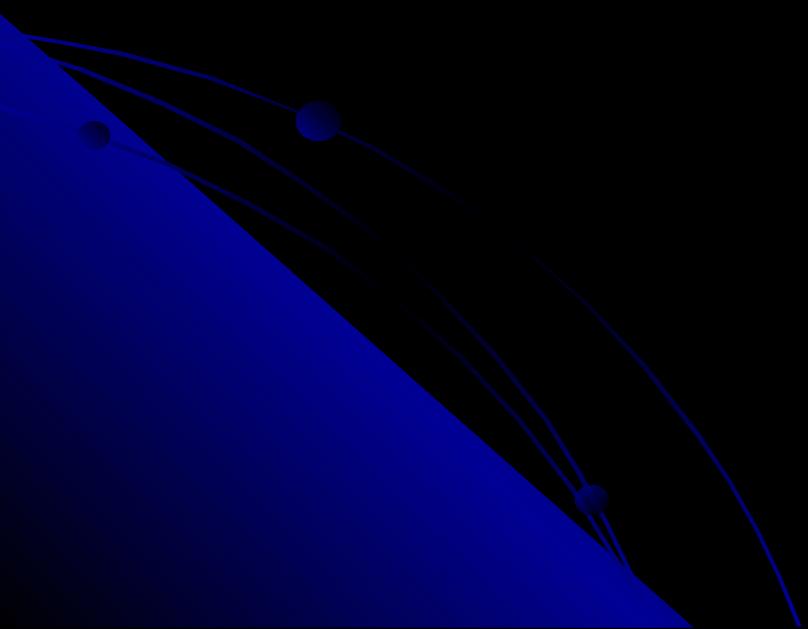
- From 1970 to 2001, 377 human cases have been reported in the U.S.
- Most were in New Mexico (201 cases), followed by Arizona (55 cases), Colorado (42 cases), and 37 cases were reported in California. (19)

Reported Human Plague Cases by County: U.S., 1970-1997



What Animals Carry Plague?

- Epidemics of plague in humans usually involve house rats and their fleas. (20)



Plague Carriers

- Rock squirrels and their fleas are the most frequent sources of human infection in the southwestern states. For the Pacific states, the California ground squirrel and its fleas are the most common source.(20)

Rock Squirrel



<http://www.hoglezoo.org/animals/view.php?id=2>

Plague Carriers

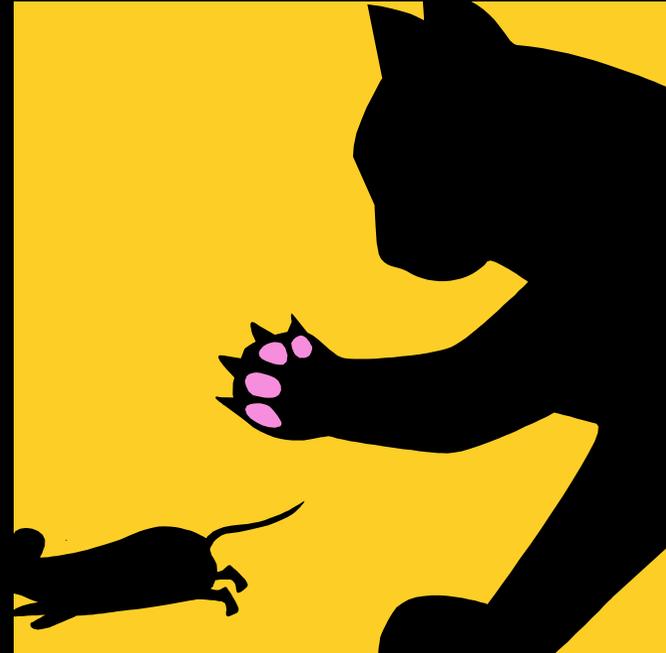
- Many other rodent species, for instance, prairie dogs, wood rats, chipmunks, and other ground squirrels and their fleas, suffer plague outbreaks and some of these occasionally serve as sources of human infection. (20)



Prairie Dog

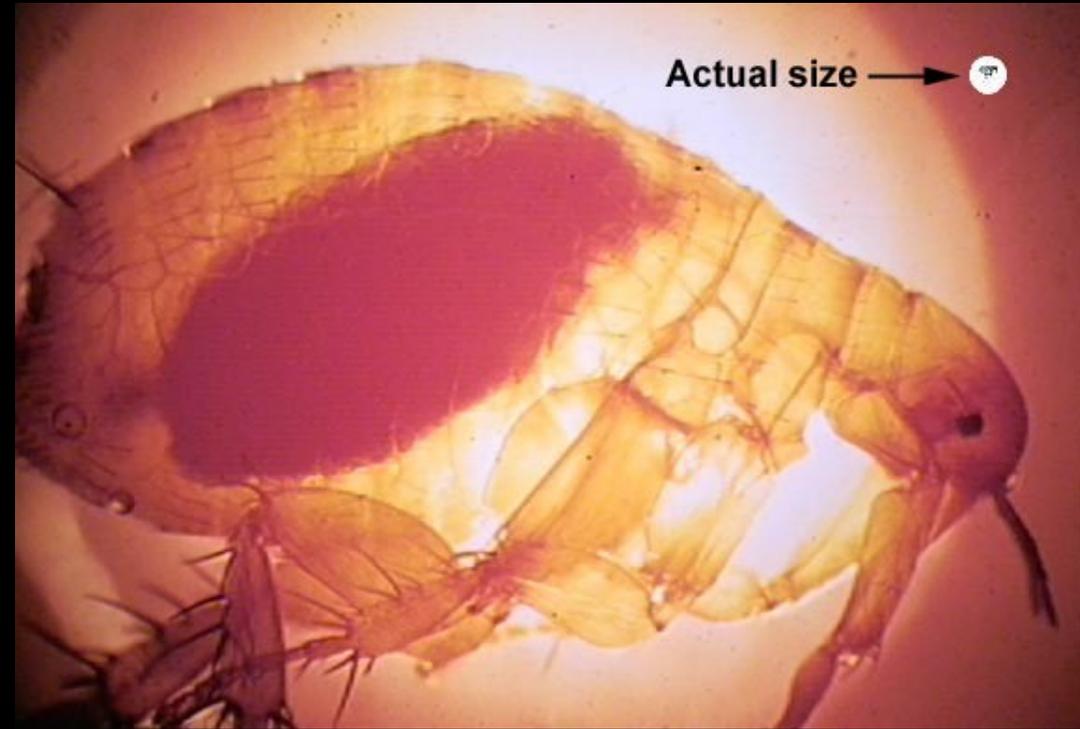
What Animals Carry Plague?

- Domestic cats (and sometimes dogs) are readily infected by fleas or from eating infected wild rodents. Cats may serve as a source of infection to persons exposed to them. Pets may also bring plague-infected fleas into the home.(20)



How is Plague Transmitted?

- Plague is transmitted from animal to animal and from animal to human by the bites of infective fleas. Less frequently, the organism enters through a break in the skin by direct contact with tissue or body fluids of a plague-infected animal, for instance, in the process of skinning a rabbit or other animal. (20)



Male *Xenopsylla cheopis* (oriental rat flea) engorged with blood.

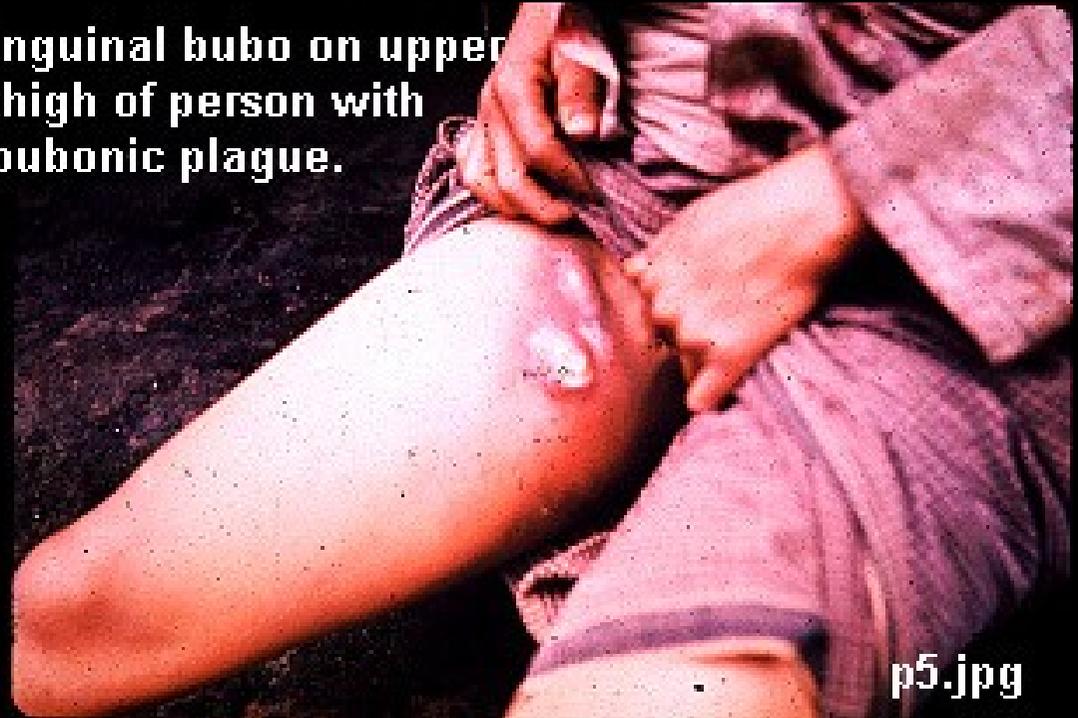
How is Plague Transmitted?

- Plague is also transmitted by inhaling infected droplets expelled by coughing, by a person or animal, especially domestic cats, with pneumonic plague. Transmission of plague from person to person is uncommon and has not been observed in the United States since 1924 but does occur as an important factor in plague epidemics in some developing countries. (20)

Plague Symptoms

- The typical sign of the most common form of human plague is a swollen and very tender lymph gland, accompanied by pain. The swollen gland is called a "bubo" (hence the term "bubonic plague"). (20)

Inguinal bubo on upper thigh of person with bubonic plague.



p5.jpg

Plague Symptoms

- Bubonic plague should be suspected when a person develops a swollen gland, fever, chills, headache, and extreme exhaustion, and has a history of possible exposure to infected rodents, rabbits, or fleas. (20)
- Approximately 15% of reported humans with plague die. (19)

Plague Prevention/Precautions

- Watch for plague activity in rodent populations where plague is known to occur. Report any observations of sick or dead animals to the local health department or law enforcement officials.
- Eliminate sources of food and nesting places for rodents around homes, work places, and recreation areas; remove brush, rock piles, junk, cluttered firewood, and potential-food supplies, such as pet and wild animal food. Make your home rodent-proof. (21)



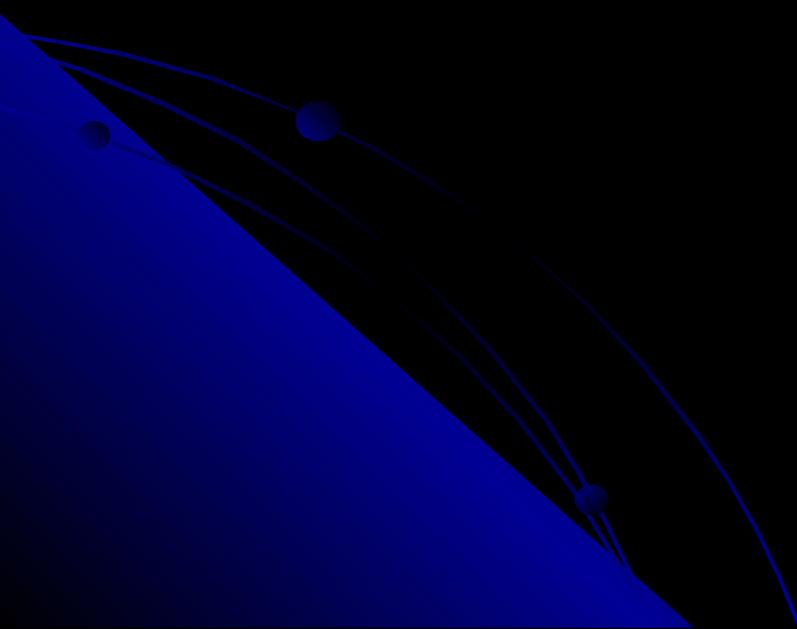
Plague Prevention/Precautions

- If you anticipate being exposed to rodent fleas, apply insect repellents to clothing and skin, according to label instructions, to prevent flea bites. Wear gloves when handling potentially infected animals.
- If you live in areas where rodent plague occurs, treat pet dogs and cats for flea control regularly and not allow these animals to roam freely. (21)



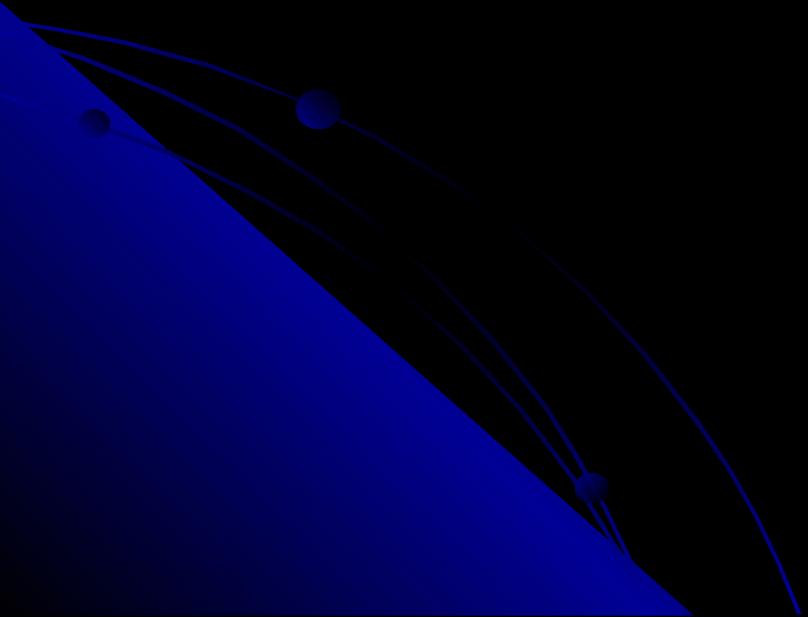
Question

- Between what months is plague commonly seen?



Answer

- March and October

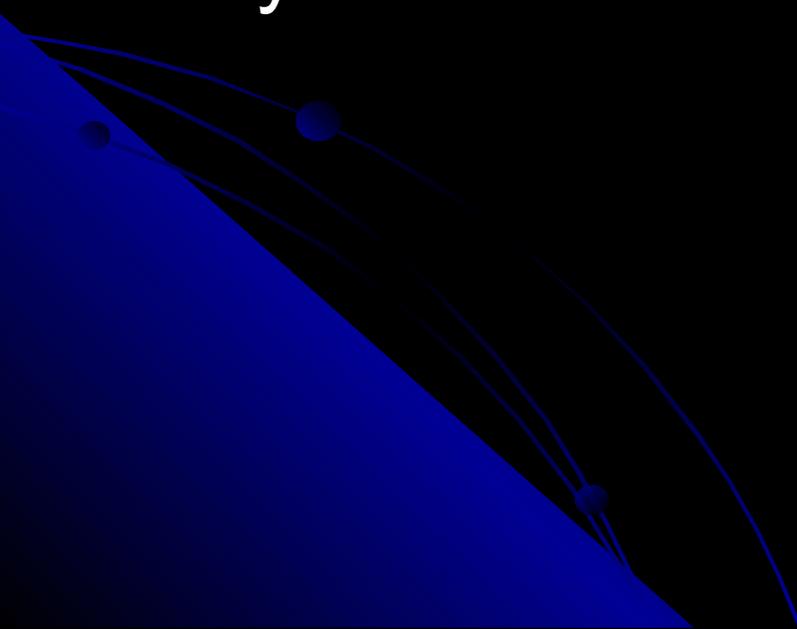


Question

- What is the most common means that plague is transmitted to people?
- 

Answer

- By the bite of an infected flea



Question 3

- Why might pet ownership increase the risk for an individual to contract plague?
- 

Answer

- Pets may eat infected rodents or bring infected fleas into the home



Leptospirosis

- What is it?
- Leptospirosis is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*. (22)



Which animals carry *Leptospira*?

- Many different kinds of animals carry the bacterium; they may become sick but sometimes have no symptoms. *Leptospira* organisms have been found in cattle, pigs, horses, dogs, rodents, and wild animals. (22)



How Do People Get Leptospirosis?

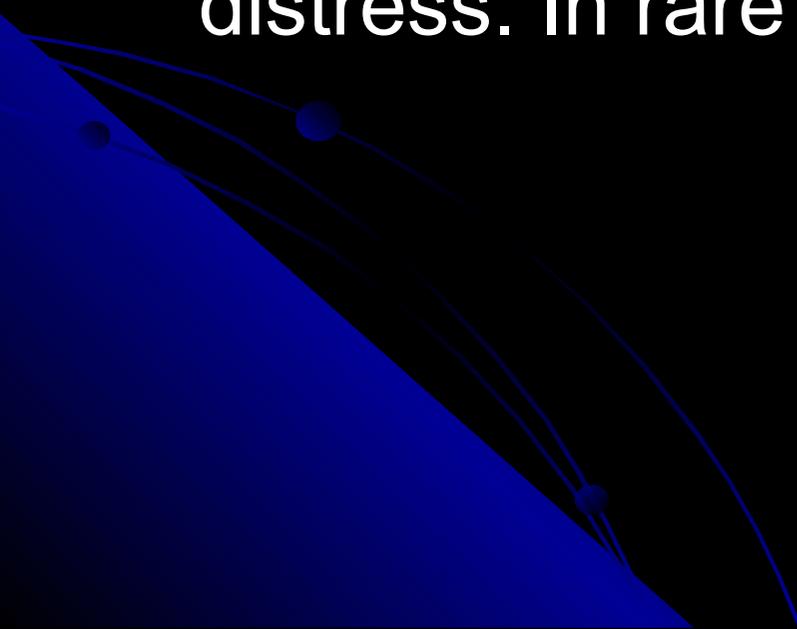
- Humans become infected through contact with water, food, or soil containing urine from these infected animals. This may happen by swallowing contaminated food or water or through skin contact, especially with mucosal surfaces, such as the eyes or nose, or with broken skin. The disease is not known to be spread from person to person. (22)

What are the Symptoms of Leptospirosis?

- Symptoms of leptospirosis include high fever, severe headache, chills, muscle aches, and vomiting, and may include jaundice (yellow skin and eyes), red eyes, abdominal pain, diarrhea, or a rash. (22)



What are the Symptoms of Leptospirosis?

- If the disease is not treated, the patient could develop kidney damage, meningitis (inflammation of the membrane around the brain and spinal cord), liver failure, and respiratory distress. In rare cases death occurs. (22)
- 

Prevention/Precautions

- The risk of acquiring leptospirosis can be greatly reduced by not swimming or wading in water that might be contaminated with animal urine. Protective clothing or footwear should be worn by those exposed to contaminated water or soil because of their job or recreational activities.

(22)

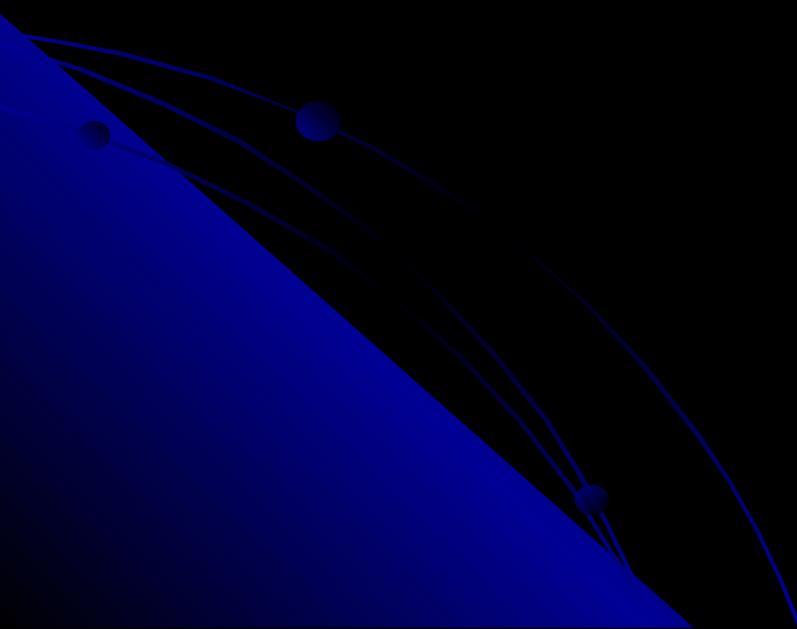
Question 1

- True or false – Animals infected with leptospirosis will always show signs of illness.



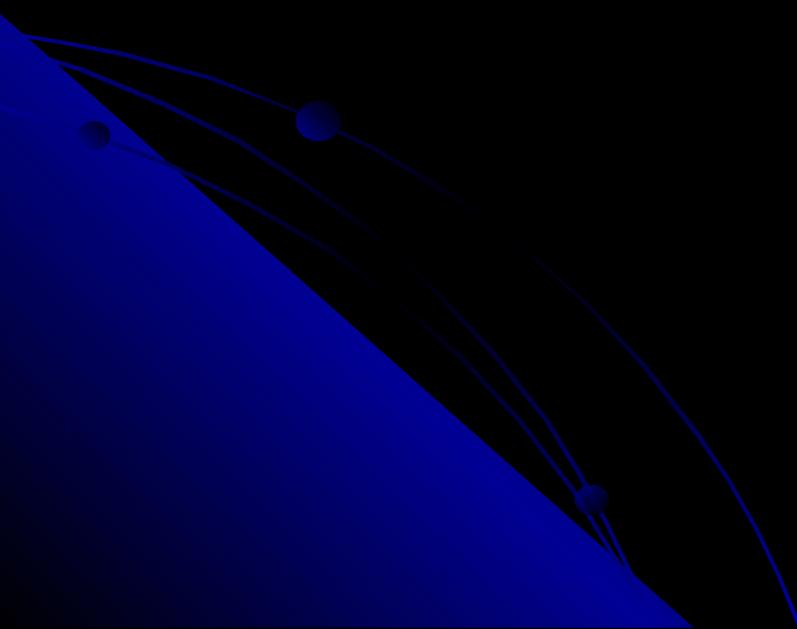
Answer

- False – animals may become infected but show no signs of illness



Question 2

- How do people become infected with leptospirosis?



Answer

- Humans become infected through contact with water, food, or soil containing urine from infected animals.
- 

Monkeypox

- What is it?
- Monkeypox is a rare viral disease that occurs mainly in the rain forest countries of central and west Africa. The disease was first discovered in laboratory monkeys in 1958. Blood tests of animals in Africa later found evidence of monkeypox infection in a number of African rodents.(23)

Monkeypox – what is it?

- The virus that causes monkeypox was recovered from an African squirrel. Laboratory studies showed that the virus also could infect mice, rats, and rabbits. In 1970, monkeypox was reported in humans for the first time.
(23)
- It looks very similar to small pox and the two are difficult distinguish. Small pox is of particular concern as a biological weapon because it has been eliminated and people are no longer vaccinated for it, creating a large population of susceptible people.

So why the concern for a disease that occurs in Africa?

- As of July 8, 2003, a total of 71 cases of monkeypox have been reported to CDC from Wisconsin (39), Indiana (16), Illinois (12), Missouri (two), Kansas (one), and Ohio (one). (24)



What animals carry monkeypox?

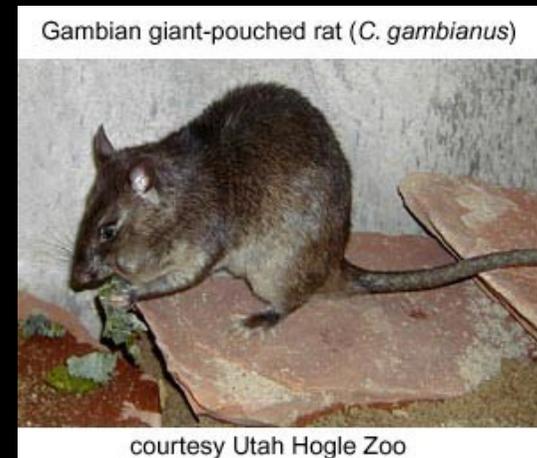
- In these cases, the patients were exposed to monkeypox by prairie dogs.
- Traceback investigations have determined that all 35 confirmed human cases of monkeypox were associated with prairie dogs obtained from an Illinois animal distributor (IL-1), or from animal distributors who purchased prairie dogs from IL-1 (24).



Prairie Dog

What animals carry monkeypox?

- Prairie dogs at IL-1 appear to have been infected through contact with Gambian giant rats and dormice that originated in Ghana.
(24)

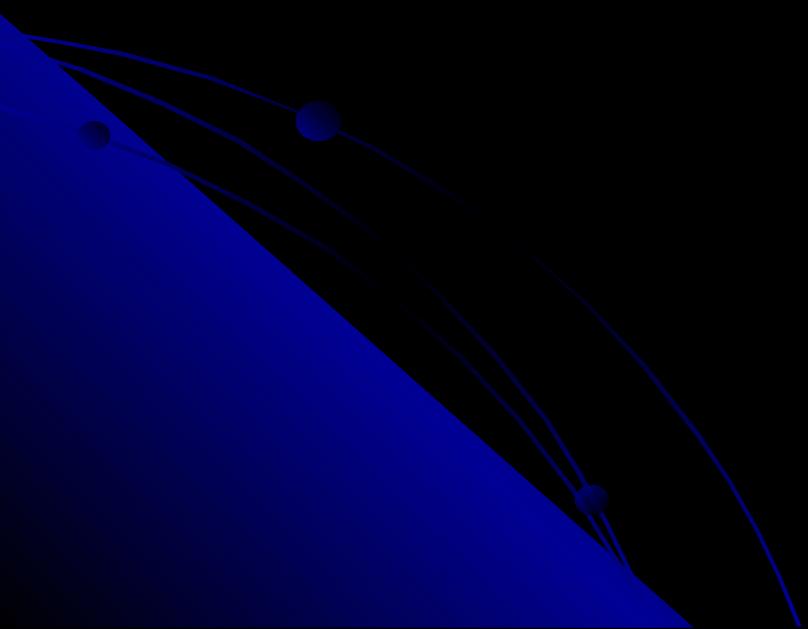


How is monkeypox contracted?

- People can get monkeypox from an animal with monkeypox if they are bitten or if they touch the animal's blood, body fluids, or its rash.
- The disease also can spread from person to person through large respiratory droplets during long periods of face-to-face contact or by touching body fluids of a sick person or objects such as bedding or clothing contaminated with the virus. (23)

Monkeypox Symptoms

- The illness begins with fever, headache, muscle aches, backache, swollen lymph nodes, a general feeling of discomfort, and exhaustion.





2. Monkeypox in an infant (Jezek, 1983)

Monkeypox symptoms

- Within 1 to 3 days (sometimes longer) after the appearance of fever, the patient develops a papular rash (i.e., raised bumps), often first on the face but sometimes initially on other parts of the body. The lesions usually develop through several stages before crusting and falling off.



Primary inoculation site right index finger, 5/27/03. 14 days after prairie dog bites, 11 days after febrile illness, hospital day 5. (25)

Child: Secondary lesions 5/27/03, adjacent to primary inoculation site on left hand. (25)



Monkeypox Precautions/Prevention

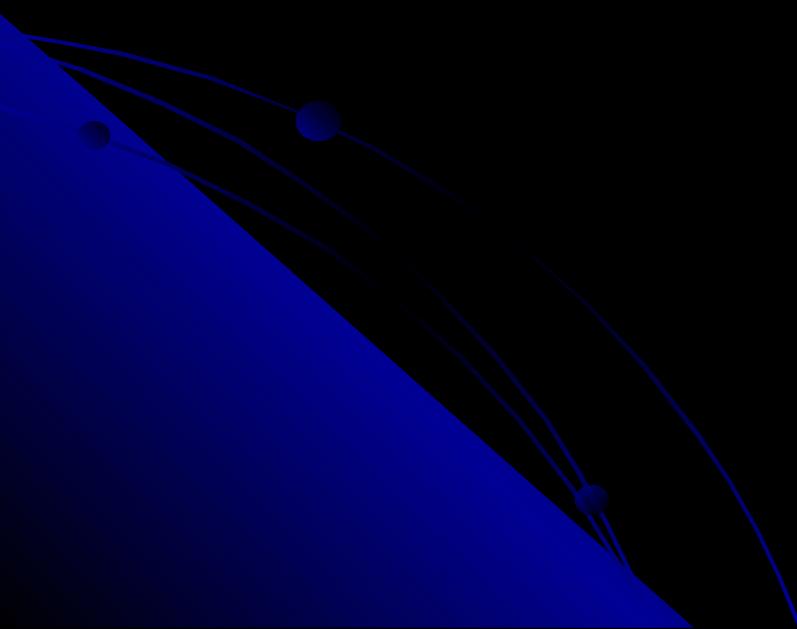
- Consult:

“Monkeypox in Animals: The Basics for People Who Have Contact with Animals” at the CDC website listed below for a detailed explanation of the issues surrounding animals and monkeypox.

<http://www.cdc.gov/ncidod/monkeypox/animalbasics.htm>

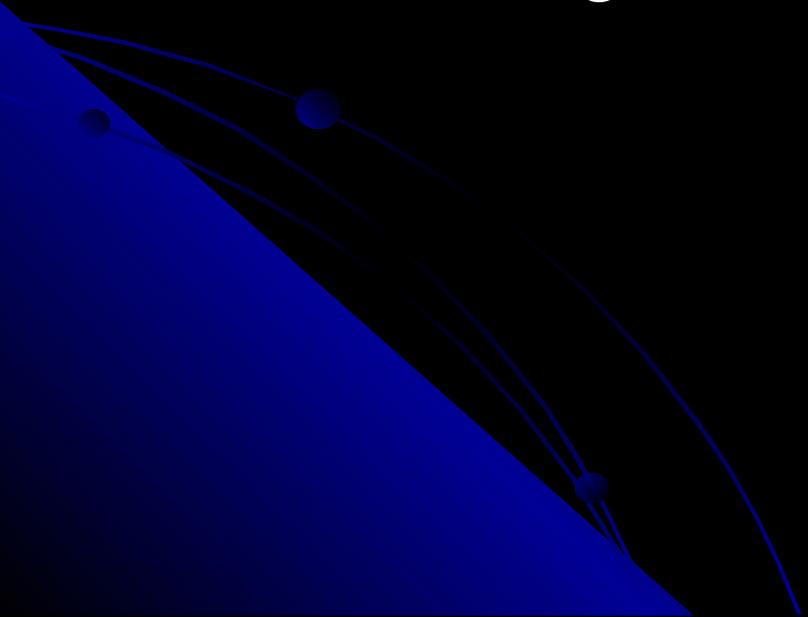
Question 1

- What animal was associated with transmitting monkey pox to people in the U.S.?



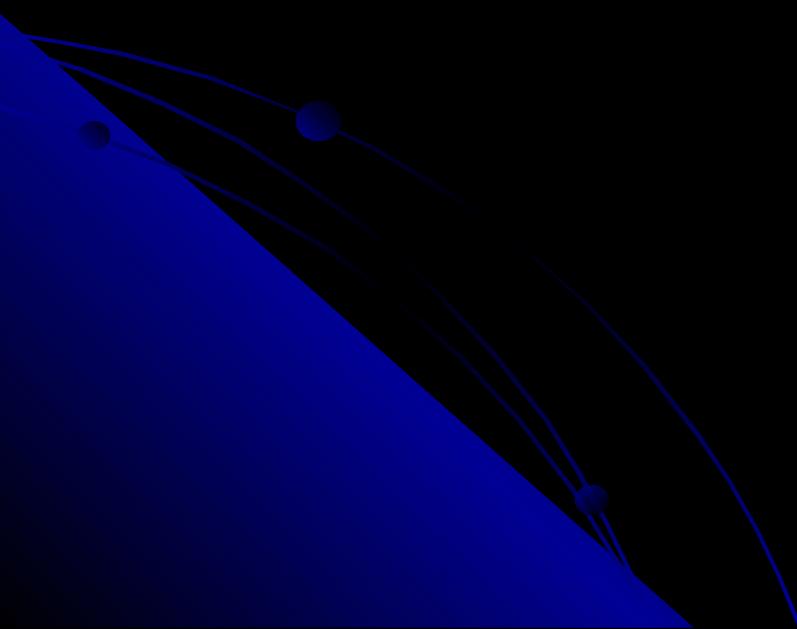
Answer

- Prairie Dogs

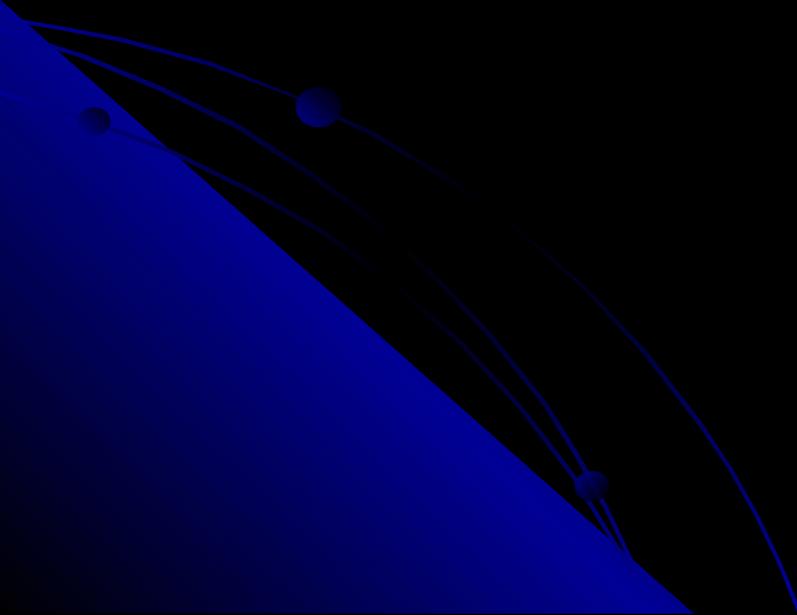


Question 2

- Why does monkey pox raise the interest of those concerned with bioterrorism?



Answer

- Because of its similarity to small pox.
- 

The Take Home Messages

- As stated at the outset, commercial suppliers and most institutional QA labs screen for these diseases, so the risk of you acquiring any of these diseases at work is minute.
- However, the importance of PPE on the job cannot be stressed enough. A new disease outbreak is always a possibility, so each animal should be treated as a potential disease carrier.

Take Home Messages

- Many rodent diseases are carried by wild rodents. In many cases, disease outbreaks among domestic rodents are caused by their interaction with wild rodents.
- Although many facilities are relatively secure against wild rodents, wild rodents do find their way into animal facilities. Therefore, it is not beyond the realm of possibility that lab mice can be exposed to disease by a wild rodent.

Take Home Messages

- ALWAYS wash your hands after handling pets or their waste. If possible, wear gloves too.
- Frequently clean cages.
- Keep an eye on children around pets, and be certain that they are frequently washing their hands.
- Be aware of the fact that in many cases pregnant women and immunosuppressed people are more susceptible to the harmful affects of these diseases.

Take Home Messages

- Keep your house clean, eliminate sources of food and nesting for rodents and do everything that you can to make it rodent proof.
- Do not purchase pets that appear to be sick.
- However, in the case of many of these diseases, animals may show no clinical signs of illness. Therefore, even if an animal appears to be healthy, people can still be at risk, and all precautions should be taken.

Take Home Messages

- If your pet appears to be sick, consult a veterinarian.
- If you become sick and have to see a doctor, tell him/her that you have had contact with animals so that can be considered for a possible diagnosis.



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Credit and disclaimer

- This presentation was created while I was an employee of Priority One Services at the National Institute of Environmental Health Sciences. Thus, both deserve credit for supporting this work.
- However, the opinions expressed in this presentation are those of the author and do not necessarily reflect those of the aforementioned groups.