Seoul Virus Fact Sheet

1. What is the Pennsylvania Department of Health doing to respond to the outbreak of Seoul virus infections in people and rats?

The Pennsylvania Department of Health is working with the CDC to investigate the outbreak of Seoul virus infections in pet rodents and humans. We are working to trace shipments and transport of rats, some of which may be infected with Seoul virus, to better understand how the virus entered the pet trade, and to interrupt transmission of Seoul virus to other rats or people.

2. Why are public health officials so concerned about Seoul virus, if it doesn't always cause severe illness in humans?

While Seoul virus infection in humans is generally considered less severe than some other types of hantavirus infections, it can still cause a severe illness in some cases. Some people may develop a severe form of infection known as hemorrhagic fever with renal syndrome (HFRS), and an estimated 1-2% of people may die after being infected with Seoul virus. Among the 11 currently known human cases, 2 were hospitalized. Because there is presently no effective treatment for Seoul virus infection, preventing infections in people is important.

3. What is a "suspected facility"?

A "suspected facility" is the facility, home, or premises of a rat breeder or owner who has recently acquired rats from a confirmed facility or who recently sold rats to a confirmed facility. CDC recommends that suspected facilities test their rats to determine if the animals are infected. State health departments are working with CDC to reach out to "suspected facilities" to notify them of their status. If a facility has not been contacted by the state health department, it is not a "suspected facility" and is not associated with the ongoing Seoul virus outbreak investigation.

4. What is a "confirmed facility"?

A "confirmed facility" in this context is a place where laboratory testing by CDC has found an infected rat or infected people. For example, it may be a home, a garage, or a building

5. How is testing for Seoul virus done in rats?

Seoul virus testing can be done on live rats by taking a small blood sample and testing it. Rats do not have to be euthanized to collect a blood sample. The blood sample is sent to CDC or to another laboratory to perform the diagnostic test for Seoul virus infection. CDC performs tests looking for both antibodies (serologic tests) and evidence of virus genetic material [by polymerase chain reaction (PCR)].

A positive result means that the rat has been infected with Seoul virus and is presumed to pose a risk for transmitting the virus to other rats or to people. A negative result means there is no evidence of Seoul virus infection in the rat at the time of the sampling.

6. I don't know if my rats may be infected. How can I get them tested?

State and local departments of health are reaching out to breeders and owners of rats from suspected or confirmed facilities. Teams working with the state department of health will visit suspected facilities, and—working with the owners—will take blood samples for testing. Owners of rats that are not linked to a confirmed facility but who want their rats to be tested may choose to do so independently through commercial laboratories.

7. Are there other laboratories besides those at CDC that can test for Seoul virus infection?

Yes. Several commercial laboratories offer testing for Seoul virus. The IDEXX* serologic (antibody) test (Opti-Spot™) and molecular (PCR) test for Seoul virus in rats yield results closely similar to those for CDC's tests for Seoul virus in rats. CDC will continue to work closely with IDEXX to compare serologic and molecular results for Seoul virus. CDC has notified the departments of health in the affected states regarding these findings and is reaching out to pet rat owners and breeders through clubs, forums, and conference calls. Serologic and molecular testing of newly arriving rats can be effective tools to prevent introduction of infected rats into non-infected colonies. Owners and breeders may wish to seek proof of a rodent's infection status prior to admitting new animals into existing colonies.

8. What is depopulation?

Depopulation means humanely euthanizing or "putting down" the rats in a colony. Because Seoul virus spreads very easily among rats housed together in a facility, and because it can be shed from an infected rat for a long time, depopulation is a way to interrupt the transmission of Seoul virus to prevent spread of the virus to other rats, to their owners, and to other people who handle them.

9. Should all facilities with rats be depopulated?

No. Different states may have different laws regarding what should be done with rats that test positive and therefore pose an ongoing risk to humans. For breeders with confirmed positive rats who want to begin selling rats again, depopulation and a thorough cleaning may be a recommended option. Depopulation is not recommended for suspected facilities. Instead, CDC recommends rats at those facilities be tested to determine if infection is present.

10. Can CDC require that a confirmed facility be depopulated?

No. While CDC may in some cases make recommendations due to the risk of transmission of Seoul virus, different states may have different laws regarding what

should be done with rats that test positive and therefore pose an ongoing risk to humans.

11. Are there alternatives to depopulating rats from a confirmed positive facility?

In some cases, depending on state and local laws, a quarantine of infected rats may be possible. A quarantine would mean making sure that infected rats are isolated from noninfected rats, will never leave the premises, will never be bred or sold, and will never go to shows or other events like swaps or barn hunts. Because Seoul virus infection does not cause symptoms in rats, and because rats may remain positive and shed virus for a very long time, a quarantine would be for the life of the animals. A quarantine requires extensive biosecurity at the facility, including restricting human access to infected rats. Additionally, persons caring for the quarantined rats are at risk for infection and must always wear protective equipment while caring for them and handling infectious bedding and waste. Check with your state health department for more details about what may be applicable in your state.

12. How many human cases of Seoul virus infection have we seen in this outbreak?

As of February 10, 2017, CDC is reporting a total of 11 laboratory-confirmed human cases of Seoul virus infection. This includes 7 from Illinois, 3 from Wisconsin, and 1 from Michigan.

13. How many infected facilities have been counted?

As of January 30, 2017, CDC is reporting 6 confirmed facilities in 2 states with evidence of either human or rat Seoul virus infection.

14. What is Seoul virus and what does infection with this virus mean?

Seoul virus is a type of hantavirus(https://www.cdc.gov/hantavirus/index.html). People that become infected with this virus often exhibit relatively mild or no disease but some will develop a form of hemorrhagic fever with renal syndrome (HFRS)(https://www.cdc.gov/hantavirus/hfrs/index.html) with death in approximately 1-2% of cases (1 to 2 persons in 100 people).

15. Where is Seoul virus found and how does it spread?

Seoul virus is found worldwide. It is carried and spread by rodents, specifically the brown or Norway rat (*Rattus norvegicus)*. The virus has been found in both pet rats and wild rat populations around the world.

16. How do people get infected with Seoul virus?

People can become infected with this virus after coming in contact with urine, droppings, or saliva of infected rodents. When fresh rodent urine, droppings, or nesting materials are stirred up (for example, when vacuuming or sweeping), tiny

particles containing the virus get into the air. This process is known as "aerosolization". You may become infected when you breathe in these contaminated materials. You may also become infected when the urine or these other materials containing the virus get directly into a cut or other broken skin or into your eyes, nose, or mouth. In addition, people who work with live rodents can get the Seoul virus through bites from infected animals. Seoul virus is not known to be spread from person to person.

17. What are the symptoms of Seoul virus infection?

When you get infected with Seoul virus, you may have the following symptoms:

- Fever
- Headache
- Back and abdominal pain
- Chills
- Nausea
- Blurred vision
- Flushing of the face
- Inflammation or redness of the eyes
- Rash

Symptoms of the illness caused by Seoul virus usually begin within 1 to 2 weeks after contact with infectious material. Rarely, it may take up to 8 weeks to develop symptoms. In rare cases, infection can also lead to a type of acute renal disease called Hemorrhagic Fever with Renal Syndrome (HFRS), which might include low blood pressure, acute shock, and acute kidney failure. However, Seoul virus infections are usually moderate and the vast majority of patients survive. Complete recovery can take weeks or months. Some people do not develop symptoms at all or have very mild symptoms.

18. How is infection with Seoul virus diagnosed?

Several laboratory tests of blood and body tissues are used to confirm a diagnosis of Seoul virus infection in patients suspected to have an infection.

19. How is infection with Seoul virus treated?

Several laboratory tests of blood and body tissues are used to confirm a diagnosis of Seoul virus infection in patients suspected to have an infection.

20. How is Seoul virus infection prevented?

Avoiding contact with rats and rodent control are key for preventing Seoul virus infections. Rodents near human communities should be controlled, and rodents should be excluded from homes. You should avoid contact with rodent urine, droppings, saliva, and nesting materials. It is important to know how to safely clean up after rodents(https:/www.cdc.gov/rodents/cleaning/index.html).

21. How do rats get infected with Seoul virus?

Seoul virus is shed in the urine, feces, and saliva of recently infected rats. Rats can become infected with Seoul virus through wounding or biting other rats and after coming in contact with the urine and feces of infected rats.

22. How do I know if my pet rat is infected with Seoul virus?

Rats do not show symptoms of disease when they are infected with Seoul virus. Rats that may have come from a facility where rats have been confirmed with infection can be tested for evidence of viral infection in a laboratory. Once infected, rats can continue to shed virus throughout their lives, potentially infecting both other rats and humans.

If you are aware of any infected rats or sick humans, please contact PADOH

at 1-877-PA-HEALTH or your local health department.

For more information about Seoul Virus, please visit the CDC website:
https://www.cdc.gov/hantavirus/outbreaks/seoul-virus/index.html

February 15, 2017