

Notes from the Conference Call with CDC, February 1, 2017 and additional materials And the Rat Fancy Think Tank Work Group

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 - All FAQs on CDC Seoul virus outbreak website *as of February 1, 2017*.
 - Please check the CDC Seoul virus website for updates, at: <https://www.cdc.gov/hantavirus/outbreaks/seoul-virus/index.html>
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Agenda

- Welcome/opening remarks: Lydia Linsmeier, Craig Manning
- CDC presentation by Dr. Barbara Knust
- Q & A session

Participants who Announced

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Karen Grant, RN, ratguide.com

Brandi Saxton, "It's a Rat's World" magazine

Natalie Baldwin, Ohio veterinarian

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From CDC:

Craig Manning, Viral Special Pathogens Branch, health communications

Barbara Knust, Viral Special Pathogens Branch, (veterinarian) epidemiologist

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Stuart Nichol, Branch Chief, Viral Special Pathogens Branch

Mary Choi, Viral Special Pathogens Branch, Epidemiologist

Beth Ervin, Viral Special Pathogens Branch, Health Scientist

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Dr. Barbara Knust, CDC, presentation

Thank you to Ms. Linsmeier for hosting this call today. My name is Barbara Knust and I am a veterinarian who has worked at CDC for 7 ½ years. Prior to that, I worked in a mixed animal practice that included care of companion animals, dog breeding facilities, and livestock producers. I understand how important animals are in peoples' lives, and I myself am an animal lover, with pets of my own. This is a very challenging outbreak involving both pet owners and breeders, with a virus that many people have not heard of before. We know there is a lot of information being circulated among pet owners and breeders about this outbreak, and CDC and state activities related to it, and our goal with this call is to share the current facts and then open it up for Q&A.

CDC is working with state health departments and others to investigate the outbreak of Seoul virus in Norway rats. The initial human case was reported in a Wisconsin pet rat breeder who was hospitalized in early December. Subsequent testing confirmed this as a recent Seoul virus infection, as well as another person in that household. Two rat breeding facilities in IL that had supplied rats to this facilities were investigated, with additional recent human cases identified there. In those facilities, over 2/3 of rats tested positive.

As of January 30, 2017, CDC is reporting a total of 10 laboratory-confirmed human cases of recently acquired Seoul virus. This includes 7 from Illinois and 3 from Wisconsin. CDC is reporting 6 confirmed facilities in 2 states with evidence of either human or rat Seoul virus infection. All facilities primarily bred rats for pets with only limited sales for feeder purposes. So, while the tracing is complicated and involves multiple states, it is still relatively limited in scope, to date. CDC has also tested (at their request) two Wisconsin residents who fed rodents from one of the confirmed facilities to their reptiles. Those individuals showed very low levels of old antibodies, indicating a possible past infection. These are not included in the current case counts because testing indicates they are not associated with this current outbreak.

While Seoul virus infection in humans is generally considered less severe than some other types of hantavirus, 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), which can include kidney failure and bleeding symptoms, and an estimated 1-2% of people may die. Among 10 currently known human cases, 2 were hospitalized. Because there is no treatment, preventing infections in people is important.

What is CDC doing?

Working with state health departments, CDC is assisting tracing the movement of rats, some of which may be infected with Seoul virus, to and from infected facilities to better understand how the virus entered the U.S. pet trade, and, as much as possible, to interrupt the ongoing transmission of Seoul virus to other rats or people. A 'confirmed facility' is a place where laboratory testing by CDC has found infected rats or infected people. It may be a home, a garage, or a building, for example. In contrast, a "suspect facility" is the premise 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—but cannot force—that suspect facilities test their rats, in order to know if they might be infected. Seoul virus testing can be done on live rats by taking a small blood sample. 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 be pose a risk for transmitting it to other rats or to people. A negative result means that there is no evidence of Seoul virus infection in the rat at the time of the sampling.

What is CDC recommending?

For breeders with confirmed positive rats who want to begin selling rats again, depopulation and a thorough cleaning is the recommended option. Depopulation is not recommended for suspected facilities. Instead, CDC recommends they be tested first to determine if infection is present.

Depopulation means humanely euthanizing the rats in a colony. Because Seoul virus spreads very easily among rats housed together, and because it can be shed by 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. Different states may have different laws regarding what should be done with rats that test positive or and therefore pose an ongoing risk to humans, or with confirmed facilities. In some cases, depending on state and local laws, a quarantine of infected rats or confirmed facilities may be possible. A quarantine would mean making sure that infected rats are isolated from other non-infected 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 does not cause symptoms in rats, and because rats may remain positive and spread virus for a very long time, a quarantine would have to be for the life of the animals. A quarantine requires extensive biosecurity at the facility. 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.

Commercial laboratories, like IDEXX and Charles River Labs, are known to many members of the pet rodent community, and may offer testing for Seoul virus or other hantaviruses. CDC is reaching out to these other labs to determine if the different tests being offered have the same accuracy as CDC's tests. IDEXX is working with CDC to help determine the accuracy of the different tests. This is being done in a BLINDED fashion, meaning names and identities are not shared

with each other. Facilities who have sent their tests to IDEXX are not being identified to CDC. We will share the information of these test comparisons when we have them completed.

It is always good for rodent breeders the Best Practices outlined by PIJAC—they are readily applicable for preventing introduction of Seoul virus into your facility. The principles of testing and separating new animals introduced into your facility until a quarantine/observation period has passed, avoiding wild rodent infestations and introduction of disease from wild rodents, and periodic monitoring of the health of the animals in your colony through diagnostic testing, and monitoring the health of your employees and encouraging good cleaning practices are all strategies that can be employed.

It is important to note this is an ongoing outbreak investigation, the first of its kind in the United States. Our understanding of this virus and how common or rare it may be in the pest industry will be shaped as we conduct additional tests. In addition, different states may have different laws that influence their approach. Therefore, recommendations may change as more information becomes available. CDC has information available on its website that addresses many of these questions. I am happy to take any questions you may have.

Thank you again.

End of Dr. Barbara's discussion.

Q&A from Lydia Linsmeier Conference Call

Q: “What is the recommendation for human testing?”

A: “The CDC does test humans. They only test people who have sold to or bought from a facility/rattery that has already tested positive. And these people need to look for fever, or have been hospitalized. If you are a rattery who has not been contacted and have symptoms, go to your doctor, tell them about Seoul and your exposure to rats.”

Q: What is the exposure time to symptoms?

A: 1-2 weeks typically. However it can be up to 8 weeks. This applies to humans. For rats there is less accurate information but rats show 4 weeks after exposure.

Q: What are human symptoms?

A: Typically a mild illness. Humans may be hospitalized but most symptoms are mild and symptoms go away on their own. The worst symptom is renal failure. People do develop antibodies and after many years they will test positive. But old antibodies are fewer and show that this is from years ago and not an active state. This person is immune. This can be seen by testing.

Q: Is there a cure?

A: China has a vaccine but it has not been tested. There is no vaccine for rats, as it would cost too much to produce.

Q: Are you looking at big box stores and large breeding facilities for a possible ground zero?

A: “In 2012-2013 was the UK situation. Several human cases were found. 30% of pet owners had antibodies and there were minor cases in humans; however only the urine was tested, which is not a good test to do. Also humans were tested and rats were not. And no rats were depopulated, even in big producers. In the USA, they have not started investigating that. The situation with big facilities is different because they have huge amounts and they can easily lock down, including locking in any wild rats loose in the facilities. So they will not have rats that can be sold on lock down, so there are no rats to investigate. Thus far no link has been made to this outbreak and the large facilities.”

Q: Has ground zero been located?

A: No.

Q: If you are in a state that is not under investigation, what is recommended?

A: Refer to the CDC website for the latest information, at: <https://wwwdev.cdc.gov/hantavirus/outbreaks/seoul-virus/index.html>

Q: If a rattery does testing, what number of rats needs to be tested? What number of rats needs testing from each cage? All the rats or just some of the rats?

A: If you have 2 colonies not co-housed and they are not cross-contaminated with each other, treat them as separate. If you are co-mingling in a small colony, test all of the animals. In a larger colony, test one from each cage to get a clear picture.

Q: People are testing with IDEXX, will this be the same as the CDC approved test?

A: The CDC is evaluating the tests from IDEXX. We will know that once we are done evaluating it. Check the CDC Seoul virus website FAQ page for updates. Go to: <https://www.cdc.gov/hantavirus/outbreaks/seoul-virus/faqs-seoul-virus.html>

Q: Since the virus is still on the bedding, what is the best way to dispose of it?

A: It can be recommended that using a bleach and water solution you can spray down the bedding and let it sit on there. This will prevent the virus from being aerosolized. Then bag it up. You cannot sanitize bedding. You do not want to stir this up. Wear a mask and gloves while doing this. Then wash your hands with soap and water. But this is only for ratteries under investigation. Not everyone else.”

Q: Can this virus transmit to other rodents? And back to humans?

A: Other rodents cannot get the virus. The only hosts for the Seoul virus are by the black rat and the Norway rat.

Q: If you have not bought rats in 8 months or since before the outbreak, should you test yourselves?

A: Testing tells you if Seoul is circulating. However, it doesn't mean that if you test negative your rats are negative. But your rats might be infected."

Closing comments by Lydia Linsmeier

We will put more thoughts about this conversation on the Forum. If we come up with more questions at that point then we can get the CDC and IDEXX on another conference call. Thank you everyone for joining, and that is all.

CDC Responses to Questions asked at PIJAC conference call, January 31, 2017

Q. Are dogs at risk of getting sick from Seoul virus?

A. No. Dogs may develop antibodies after, for example, eating or chewing on an infected rat, but are not known to pass infectious virus to another animal or a person.

Q. Are you familiar with barn hunt? It's a dog sport. If wild rodents were in straw, how long would it take to be sure that it [the wild rodent] is not infectious to pet rats?

A. Yes, we are familiar with barn hunts. If the wild rodent is carrying Seoul virus – and you cannot tell just by looking – there is the possibility that virus could be transmitted to other rats that had contact with that rat. Our understanding is that, during barn hunts, rats are encased in a perforated PVC pipe or similar, which is then buried or hidden for the dogs to find. If the PVC pipe is re-used, and another rat is placed into it, there is the possibility that, if the first rat was infected and urinated and/or defecated while in the pipe, the second rat could become infected, and so on. Therefore, to break this possible 'chain of transmission,' it is advisable to disinfect the pipe between rats, using a 1:10 bleach solution or similar disinfectant.

Q. How long does the virus stay infectious in the environment, [such that it] can't be sterilized or disinfected?

A. Hantaviruses like Seoul virus are actually fragile viruses outside the host animal (rats), and can be killed, or more correctly, *deactivated* even by UV light, like sunlight. There is presently no peer-reviewed scientific data that we're aware of on how long Seoul virus could, for example, remain on a surface, like a floor, before becoming inactivated. A conservative estimate would be 7 – 10 days. One of the European hantaviruses has been shown to persist on a surface for about 15 days, but it is far from clear if this could be generalized to Seoul virus. Also important to note is that Seoul virus can be inactivated by simple soap, such as hand soap, dish soap, or laundry detergent. And, of course, disinfectants or a mixture of 10:1 water/bleach will also inactivate the virus.

Q. Regarding breeders: there are meetups and roundups where rats are close together and exchanged among breeders. If purchased from one, there might be variables of exposure.

A. Since there is no clear way to determine whether a pet rat is infected with Seoul virus, rats that are comingling could, if one of the rats was already infected with Seoul virus, pass the virus on to other comingled rats. Rats carrying the virus are presumed to remain chronically infected with Seoul virus, and may shed virus in their urine, feces, and saliva for extended periods of time. Owners concerned about introducing Seoul virus to their colonies should take care to minimize situations where their rats may comingling with others.

Q. If a human tested negative, can the rats be considered likely safe?

A. Not necessarily. For example, newly-arriving rats may be infected, and if they or their excretions or bedding are handled by the owner, the owner is at risk for becoming infected. Rat owners swapping animals at shows or events poses a similar risk, but it's hard to quantify the risk, since an infected animal will not be showing any obvious signs of illness. This point, by the way, underscores the importance of regular handwashing by breeders and owners.

Q. Any advice we can give to breeders in unaffected states?

A. Yes. Encourage them to visit the CDC website, which has useful and timely information related to the Seoul virus outbreak, at: <https://www.cdc.gov/hantavirus/outbreaks/seoul-virus/index.html>

All FAQs on CDC Seoul virus outbreak website as of February 1, 2017

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

Seoul virus is a type of [hantavirus](#). Infection with Seoul virus is known to cause a mild to moderate illness that is rarely fatal. It is estimated that about 1 to 2% of patients may die (1 to 2 persons in 100 people).

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.

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.

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.

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.

How is infection with Seoul virus treated?

Supportive care is given to patients with Seoul virus infections. Care includes fluid therapy by giving the patient liquids directly into the vein to maintain blood volume, blood pressure, and electrolyte (sodium, potassium, chloride) levels. Oxygen mask may also be used as well as appropriate treatment of any secondary infections. Dialysis may be required in severe cases of kidney failure. Ribavirin, an antiviral drug, has been shown to reduce the illness severity and lower deaths related to Seoul virus infections if used very early in the disease.

How is HFRS 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](#).

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.

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 who may have come from a facility where rats have been confirmed with infection can be tested for evidence of viral infection in a laboratory.

What is CDC doing to respond to the outbreak of Seoul virus infections in people and rats?

CDC is working with state health departments and others 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.

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 10 currently known human cases, 2 were hospitalized. Because there is presently no effective treatment for Seoul virus infection, preventing infections in people is important.

What is a “confirmed facility”?

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

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 suspect facilities test their rats to determine if the animals are infected.

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.

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.

Are there other laboratories that can test for Seoul virus infection besides CDC?

Yes. Commercial laboratories, like IDEXX and Charles River Labs*, are known to many members of the pet rodent community and may offer testing for Seoul virus. CDC is reaching out to these other labs to determine if the different tests being offered have the same accuracy as CDC’s tests.

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.

Should all facilities with rats be depopulated?

A9. 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.

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.

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 non-infected 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.

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

As of January 30, 2017, CDC is reporting a total of 10 laboratory-confirmed human cases of Seoul virus infection. This includes 7 from Illinois and 3 from Wisconsin.

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.

**Names of commercial companies are provided for information purposes only and do not constitute an endorsement by CDC or the Department of Health and Human Service.*

Contact Information

If you have question, CDC-INFO (1-800-CDC-INFO) provides information about hantaviruses to callers in the United States. You may also call CDC's Hantavirus Hotline at 877-232-3322 and 404-639-1510.

Related links:

[Healthy Pets, Healthy People](#)

[Rodents](#)