Scientists sort through theories to explain hantavirus outbreak

September 26 2012, by Sandy Kleffman

Scientists seeking a cause for the deadly hantavirus outbreak among Yosemite National Park visitors over the summer are investigating whether a spike in the deer mouse population, combined with the unusual design of some tent cabins that enabled mice to nest in the insulation, made it easier for people to contract the rare disease.

Experts consider another theory - that the virus recently mutated and became more transmissible to humans - a long shot.

The initial findings of federal health authorities who have sequenced the virus' genome using samples from those who fell ill indicate that the virus has not changed, said Danielle Buttke, a veterinary epidemiologist with the National Park Service.

But others continue to explore that theory until it can be definitively ruled out.

Dr. Charles Chiu, a researcher at the University of California, San Francisco, agrees that the prevalence of deer mice and the tent cabin design are the most likely culprits.

But Chiu, who directs the UCSF-Abbott Viral Diagnostics and Discovery Center, plans to have his lab sequence genomes from all of the visitors who fell ill, as well as those in deer mice gathered in the Sierra, Bay Area and throughout California. He will then compare the current strains to historical ones.

"I think it's more likely to be a change in the environment, but without doing the sequencing, I can't exclude that and that's why we're doing the study," Chiu said.

Unlike the flu virus, which changes so often the vaccine must be revised every year, the hantavirus has been relatively stable, Chiu said. Yet the possibility that a mutant or variant strain could develop still exists.

"The question really is: Do we have the whole story here?" Chiu said.

One thing nearly everyone agrees upon: The cluster of cases linked to Yosemite is highly unusual.

Nine people who spent at least one night at the park since June became infected with the virus, and eight went on to develop hantavirus pulmonary syndrome.

Three people died, and the rest are recovering. No vaccine, treatment or cure exists. Doctors try to keep people alive long enough for their immune systems to rid their bodies of the virus.

Seven of the infected people had stayed in the "signature" tent cabins in Curry Village. The cabins' double-walled design enabled mice to nest undetected in the insulation between the two walls, Buttke said.

The park service has closed the signature cabins indefinitely while it investigates how to protect the public.

Since hantavirus pulmonary syndrome was first identified in 1993, medical experts have confirmed 60 cases in California and 602 nationally.

Typically, the cases are isolated, with only one or two occurring at a

time, Chiu said. So when the cluster of cases became apparent at Yosemite, scientists began racing for answers.

Deer mice shed the virus in their urine, droppings and saliva. People typically become infected by breathing in air contaminated with tiny particles containing the virus.

Much about the hantavirus remains a mystery. Sunlight kills it, and in a laboratory setting, it has remained viable for about 48 hours, Buttke said, although it may be able to live a few days beyond that. Experts believe an area must have an active mouse infestation for people to become infected.

So is there a big increase in the deer mouse population in Yosemite this year?

The answer is probably yes, although proof is hard to come by, Buttke said.

Authorities do not have solid population numbers from previous years, so the evidence is mainly anecdotal: State health officials have caught more mice in traps this year, and people who live in the area report they are seeing more mice.

State and federal authorities are looking at ways to improve monitoring of the mouse population, Buttke said.

Predators of the rodents include owls, foxes, snakes and wolves. As more people crowd into Yosemite Valley, the predators may be scared away, creating conditions for rodents to thrive and multiply.

Tests indicate that about the same percentage of deer mice are infected with the hantavirus as in previous years, Buttke said. About 13.7 percent

of mice trapped in Yosemite near the end of August were infected, which is close to the 14 percent statewide average.

When the first hantavirus outbreak was identified in the Four Corners area of the Southwest in 1993, researchers concluded that after several years of drought, plants grew in abundance after heavy snow and rainfall. With plenty to eat, the deer mouse population ballooned to 10 times what it had been the year before.

Experts investigating the Yosemite cluster are also analyzing the role people may play. They are asking those who stayed in the signature cabins what they did both inside and out of the buildings, looking for patterns.