

Testing Transmission and Infection of H5N1 Flu From Cows

Researchers found that an H5N1 flu virus from cows could infect mice and ferrets, but airborne transmission wasn't very efficient.

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Highly pathogenic H5N1 influenza viruses spread mostly among birds, but occasional infections in mammals do occur. The first documented outbreak of H5N1 in cattle occurred in the United States in spring 2024. During this outbreak, the virus has spread within and between cattle herds. In addition to poultry, cats and people have also been infected. If the virus spread through the human population, it could pose a great risk to public health. Yet how the cow H5N1 virus transmits between mammals isn't well understood.

A research team led by Dr. Yoshihiro Kawaoka at the University of Wisconsin–Madison studied an H5N1 virus isolated from the milk of an infected cow in New Mexico. Using mice and ferrets as models, the researchers examined how the virus spread within the body and between individuals. Results from the study, which was funded in part by NIH, [appeared in Nature](#) on July 8, 2024.

The team found that mice became infected with the virus after consuming unpasteurized milk from an infected cow. Both mice and ferrets could also be infected through the nose. In both animals, the virus then spread to organs and tissues beyond the respiratory system. These included mammary glands and muscle. A comparison H5N1 virus, typical of those that have infected humans before, spread to the same tissues.

Because the team found virus in mammary glands, they tested whether it could spread from mother to offspring via milk. Within a week of infection, the virus was detected in the mammary glands of lactating female mice, and some of their nursing pups became infected. Adult mice housed together with infected females did not get infected, suggesting that the pups were infected via milk.

To test whether the virus can transmit through the air in respiratory droplets, the researchers housed uninfected ferrets in cages next to infected ones. For almost two weeks, the exposed ferrets never developed disease symptoms or had virus detected in nasal swabs. But one out of four exposed ferrets did show an immune system response to the virus, suggesting infection.

Human influenza viruses bind to a structure on the surfaces of cells in the human upper

respiratory tract that allows them to enter the cells. Bird influenza viruses, in contrast, usually bind to a different, related structure. But the team found that the cow H5N1 virus could bind to both. This suggests that the virus could infect cells in the human upper respiratory tract.

Taken together, these results suggest that H5N1 in cows can infect other mammals, including humans, via raw milk. But they also suggest that airborne transmission isn't very efficient. Thus, the virus isn't likely to spread this way, limiting its potential to cause a human pandemic. Yet the researchers noted the need for continued vigilance, as viruses can mutate. They can also exchange genetic material with other influenza viruses that may help them spread more easily in humans.

"The H5N1 virus currently circulating in cattle has limited capacity to transmit in mammals," Kawaoka says. "But we need to monitor and contain this virus to prevent its evolution to one that transmits well in humans."

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