Researchers uncover clues to horse herpes and neurologic disorders

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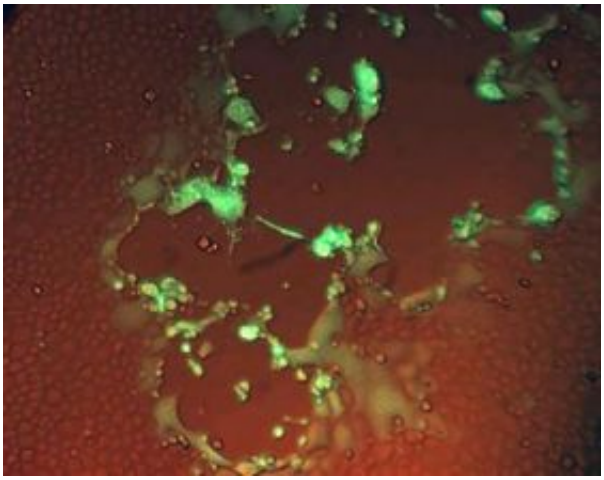

Green areas show hundreds of cells infected with EHV-1. Credit: Klaus Osterrieder Lab/Cornell

Sometimes, a small change can make a big difference. Such is the case with the horse herpes virus: A change in just one amino acid can make all the difference between triggering a cold or a life-threatening neurological disorder.

Cornell microbiologists have shown that a single amino acid variation in an enzyme that is part of the DNA copying process of equid herpesvirus type 1 (EHV-1) creates a different type of EHV-1, which causes the neurological disorders in horses. Both types of EHV-1 can also cause abortions.

The researchers' paper is published in the Nov. 9 issue of *PLoS Pathogens*, published by the Public Library of Science.

The horse herpes virus, a close relative of the chickenpox virus in humans, lives in horses' nostrils and is commonly spread by droplets in the air. And horses remain infected for life. Recently, veterinarians noticed a rise in outbreaks of the neurological form of EHV-1, which can devastate entire herds. Close to one-third of horses that develop the neurological disease end up dying or being euthanized.

"There are apparently two distinct pathotypes of EHV-1 out there, and one is more likely than the other to cause the neurological disease. This study provides the ultimate proof," said Klaus Osterrieder, the paper's senior author who is professor of virology in the Department of Microbiology and Immunology in Cornell's College of Veterinary Medicine. Laura Goodman, who was a graduate student in the Osterrieder laboratory and is now a postdoctoral associate at Cornell's Baker Institute for Animal Health, is the paper's lead author.

After cloning the genome of the virus obtained from a mare that had both lost a fetus and developed neurological symptoms, the researchers then altered one amino acid in the viral enzyme known as DNA polymerase and rendered the virus unable to cause neurological disease. The amino acid change reduced levels of the virus in the horse's bloodstream, and low levels of the virus reached the central nervous system. The mutation also made the virus more susceptible to antiviral drugs. The researchers believe the reduced replication and levels of virus in the blood may be why one form of the virus does not cause neurological disorders.

"The two pathotypes replicate to similar levels in the horse's nose and spread to other horses with similar efficiency, so interventions should be equally rigorous for all infections," said Osterrieder.

The fact that EHV-1 is a virus and, thus, does not respond to antibiotics underscores the need for prevention, which includes limiting contact and using separate feeders for infected horses. Also, handlers should be careful not to transfer the virus with their clothes, shoes, hands and gear. While vaccines are available that create an immune response against the EHV-1 respiratory disease, no vaccine is currently known to efficiently protect horses against the neurological disease. Only a few vaccines were shown to protect against abortion.

The researchers postulate that herpes viruses evolve toward strains that produce less disease, so they think that the more virulent neurological strain is older than the milder type of EHV-1.

Source: Cornell University