Equine Research Coordination Group White Paper

(Photos available upon request)

FOR IMMEDIATE RELEASE
Tuesday, Nov. 6, 2007
Contact: Anne Dadds, Research Coordinator
American Association of Equine Practitioners
(859) 233-0147; adadds@aaep.org

Protecting Against the Emergent Neuropathogenic Strain of Equine Herpesvirus-1

The most common infectious equine viruses are herpesvirus and influenza. So when a viral pathogen of one of them evolves and increases in virulence, and if there are no effective prevention or treatment options available for use against the emergent strain, the potential impact on the horse industry can be great.

The emerging problem of equine herpesvirus-1 (EHV-1) infection is high morbidity from a potentially fatal neurologic disease. The disease appears most often in settings where large numbers of horses are stabled. In addition to deaths of horses, the collective costs associated with treatment, quarantine, testing and the inability of quarantined horses to compete are frequently substantial. Of particular concern is the potential of this strain of EHV-1 to force the cancellation of large racing and show events. And that doesn't take into consideration the distress for the horse owner.

The first recorded outbreak of equine neurologic disease linked to EHV-1 infection by successful virus isolation from nervous tissue occurred in 1966. Evidence from retrospective surveillance of EHV-1 disease outbreaks indicates only a rare and sporadic occurrence of neurologic involvement prior to 2000. But in the first few years of the current millennium, outbreaks of the disease involving the central nervous system have increased. From 2000 through 2006, there were 25 laboratory-confirmed outbreaks of equine paralytic disease caused by EHV-1 reported to state regulatory agencies. The total number of exposed horses in six of the outbreaks (452) that developed neurologic signs was 119 (26%), and the number of deaths among these 119 horses was 35 (29%). During 2005 and 2006, state animal health officials in the U.S. reported 12 occurrences of EHV-1 neurologic disease to the USDA. Seven of the occurrences involved racing venues in five states (Kentucky, Michigan, Pennsylvania, Maryland and New Jersey) and five occurred in veterinary clinics or boarding facilities in five additional states (Virginia, California, Colorado, Florida and New York).

At greatest risk for the emerging herpesviral disease are any congregations of horses assembled from diverse origins and housed under high-density, stress-ridden, and heavily co-mingling conditions for the purposes of racing, training, shows or other performance events. Within that demographic group, horses of all breeds, ages, gender and vaccination status may be affected. Elderly horses (over 20 years old) bear the greatest burden of neurologic morbidity and mortality.

The most commonly identified risk factors for development of the disease are stress, age-related immunosenescence (gradual failure of the immune system that develops with age), prolonged transport, intermingling of horses from diverse locations without prior isolation and high-density stabling in large facilities that share a common air space. Management practices that result in increased levels of stress in horses include shipping, abrupt changes in dietary composition and disruption of established social hierarchies. Because such practices are an integral and unavoidable part of racing and other performance events, their role as risk factors will likely continue. For the individual horse,

the greatest risk factor for post-exposure development of EHV-1 paralytic disease is a low pre-infection level of cellular immunity directed against the mutant herpesvirus. Therefore, an effective vaccine needs to stimulate a strong EHV-1 specific cellular immunity.

All EHV-1 isolates recovered from recent neurologic outbreaks represent a mutant virus strain that encodes a particularly robust replicase enzyme. Though the mutation in the new EHV-1 biovar or mutant virus strain is tiny – a switching of only one of 1,000 amino acids in the enzyme that replicates the viral genome – it replicates more efficiently in the horse, achieving 10-fold higher levels of virus within the blood and vasculature of the central nervous system. Of singular importance is its enhanced virulence for the nervous system with greater morbidity, higher mortality and increased potential for causing an epidemic.

Epidemiologic studies of the prevalence of latent infection with the highly pathogenic strains of EHV-1 are under way in localized horse populations; one being 12,000 Thoroughbred broodmares in Central Kentucky. Using a specific diagnostic test, latent EHV-1 infection was detected in 54 percent of 132 Thoroughbred mares submitted for necropsy to the University of Kentucky's Livestock Disease Diagnostic Center, and eight percent of the mares were carriers with no clinical signs of the highly pathogenic, mutant strain of EHV-1. These preliminary results indicate that the neuropathogenic strain of EHV-1 may have already established a significant latent reservoir (carriers of the virus) within some of the nation's horse populations. Such a high prevalence of latency rules out any hope for eradicating the mutant herpesvirus carrier horse subpopulations from horse herds. Of particular importance, from a control point of view, is the role of such latently infected carrier horses in perpetuating the disease. Estimation of the *national* carriage rate, herd prevalence and breed and geographic distribution of the evolving EHV-1 mutant would now seem to be a priority for the USDA's National Animal Health Monitoring System.

The recent outbreaks of EHV-1 neurologic disease with widespread geographic distribution and the evolving increase in virulence have led to the designation by the USDA of this hypervirulent strain as a "potentially emerging herpesvirus pathogen" of the horse. The factors underlying this increase in the number of neurologic episodes are unknown.

Veterinarians presently have few weapons against this EHV-1 strain. The highest priority and the greatest gap in our research on this emerging pathogen is development of an effective vaccine. Currently marketed vaccines are not adequate, and reports of neurologic outbreaks in fully vaccinated horses are common. Likewise, a significant level of efficacy of anti-herpesviral drugs (e.g., acyclovir or valacyclovir) in protecting horses from infection by highly pathogenic EHV-1 has not yet been established. Research to develop a better vaccine is under way in several laboratories and is focusing on 1) identification of the specific immune defenses of the horse that are most active against the mutant EHV-1, and 2) construction of a safe and effective, live-virus vaccine able to stimulate such protective immune mechanisms. Funding is needed to support this research.

Biosecurity Measures

In the absence of effective preventive or therapeutic means for controlling the neurologic form of EHV-1 infection, the best prospects for minimizing the number, magnitude and economic impact of outbreaks are biosecurity strategies (entry requirements, isolation protocols, movement-restriction and infection-control procedures). Biosecurity means adherence to a prescribed set of infectious disease control principles to reduce 1) the risk of introduction of the viral agent onto the equine premises; 2) the spread of any introduced infection to other horses on the premises; and 3) the spread of infection beyond the infected premises to horses at other facilities.

To diminish introduction of active virus into and its subsequent spread within a facility, entering horses should be accompanied by an official health certificate (Certificate of Veterinary Inspection), verifying recent vaccination, absence of recent fever or other clinical signs, and absence of infectious disease on the premises from which the entering horse was transported. Where practical, new entries should be placed in an isolation facility for

observation and daily temperature recordings for two to three weeks prior to co-mingling with other horses on the premises. A movement-restricted quarantine is usually imposed by state regulatory officials on EHV-1 affected premises or on the stable(s) in which EHV-1 infection has been identified. Hygienic measures (use of gloves, coveralls, hand-washing, disinfecting footbaths, waste sterilization, etc.) are instituted to prevent spread of the virus from the isolation area. Performance events in the region may be restricted or cancelled altogether. A premises (or barn) becomes eligible for release from the quarantine when all horses test negative for EHV-1 after a three-week period during which no evidence of new cases of infection occur.

Although these biocontainment measures undoubtedly assist in curtailing the frequency, magnitude and mortality of EHV-1 neurologic outbreaks, they cannot provide a guarantee of freedom from the disease, and additional outbreaks can be expected wherever horses congregate. Development of a vaccine as well as a rapid test to detect the presence of the virus in affected horses is needed to prevent EHV-1 infections.

The veterinary community needs your assistance to increase funding for research on herpesvirus and other disease problems affecting horses. Please contact the American Quarter Horse Foundation (www.aqha.com/foundation), Grayson Jockey-Club Research Foundation (www.grayson-jockeyclub.org), Morris Animal Foundation (www.morrisanimalfoundation.org), the American Association of Equine Practitioners Foundation, Inc. or your favorite veterinary school to make a contribution.

Please contact the AAEP Foundation (www.aaepfoundation.org) for information about making a donation for equine research, or call 1-800-443-0177 (within the U.S.) or 859-233-0147. This is just one of the many efforts that the AAEP is coordinating on behalf of the industry through the Equine Research Coordination Group (ERCG), which is comprised of researchers and organizations that support equine research. Formally organized last year, the ERCG has a mission of advancing the health and welfare of horses by promoting the discovery and sharing of new knowledge, enhancing awareness of the need for targeted research, educating the public, expanding fundraising opportunities and facilitating cooperation among funding agencies.

By Dr. George P. Allen, PhD
On behalf of the Equine Research Coordination Group

The ERCG is a group comprised of researchers and organizations that support equine research. Participants in the ERCG include equine foundations and multiple university research representatives. Current participants include: AAEP Foundation, American Horse Council, AQHA Foundation, Grayson-Jockey Club Research Foundation, Maxwell H. Gluck Equine Research Center, Morris Animal Foundation, Havemeyer Foundation, United States Equestrian Federation Foundation and university researchers including: Noah Cohen, VMD, PhD (Texas A & M University), Greg Ferraro, DVM (University of California – Davis), Eleanor Green, DVM (University of Florida), Dick Mansmann, VMD, PhD (North Carolina State University), Wayne McIlwraith, BVSc, PhD (Colorado State University), Jim Moore, DVM (University of Georgia), Rustin Moore, DVM, PhD (The Ohio State University) and Dr. Nat White DVM (Virginia Tech). For more information about the ERCG, please visit online at http://www.aaepfoundation.org and click on the ERCG link.