ON-TRACK RESPIRATORY DISEASE STUDY

A Cooperative Project Between
the UC Davis Equine Viral Disease Laboratory and
the Southern California Equine Foundation

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Respiratory disease is second only to lameness in its propensity to cause lost training days and excessive veterinary expense. Viral infections are one of the most frequent causes of respiratory disease. A number of different types of viruses are implicated in viral respiratory disease, including equine influenza, rhinitis, adenoviruses, herpes, arteritis, and reoviruses. While any horse can become infected by these viruses, horses involved in the rigors of athletic training and competition are particularly susceptible due to stress. Moreover, because many racehorses are 2 to 3 years of age, their immune systems are relatively naïve compared with older horses. This naiveté may serve to increase the scope of the problem among an ever-changing population of closely housed individuals.

While these viruses and the illness they cause have long been recognized, positive diagnosis and identification of the specific virus are not often made because serological analysis or viral isolation through culture have historically been laborious, time-consuming and expensive. Even when these techniques are successful, the information gained has not been timely enough to be useful to the clinician.

In recent years, these difficulties have been overcome with the advent of sophisticated molecular testing techniques. Now, instead of trying to isolate and grow a virus in culture, virologists can test for genetic material characteristic of a given virus and often identify different strains of that virus. These new methods have allowed veterinarians to make a much more rapid and accurate diagnosis of viral respiratory disease. Nasopharyngeal swabs and other sampling techniques can now be used to test for the type and relative amount of virus present within the respiratory tract of horses.

This newfound testing ability has created its own set of problems for the veterinary diagnostician, however. These tests are so sensitive and accurate that they retrieve and identify any and all viruses present. Given that a horse can have many viruses present in its respiratory system at any one time, how do we determine which one is the primary causative agent, which act merely as facilitators for disease, and which are simply present but not participating in disease production?

These and other questions led to the organization of a unique research study conducted through the cooperative efforts of the UC Davis Equine Viral Disease Laboratory and the Southern California Equine Foundation. These two organizations have combined resources and personnel to assist Dr. Stephanie Bell in the pursuit of answers to these questions. Dr. Bell has been awarded an Edwin J. Gregson Fellowship in Equine Studies by the Center for Equine Health to

conduct research leading to a Ph.D. in equine infectious disease. Her current work involves the analysis of equine respiratory viruses and the role they play in disease production.

Dr. Bell's initial study conducted at Santa Anita and Hollywood Park racetracks involved the collection of nasopharyngeal swabs from horses 2 through 6 years of age from three different stables at both tracks. The swabs were collected three times at one-month intervals from horses ascertained to be free of clinical respiratory disease. The concept for the study was that if we could determine what types of viruses and virus subtypes were present in horses at these training facilities when disease was not present, then we could more accurately determine specific causative viral agents when disease occurred.

The results of the study showed that equine rhinitis A or B1 virus, equine herpes virus (EHV) 3 and 4, equine adenoviruses 1 and 2, equine arteritis virus (EAV), and influenza were not present in any of these horses. However, positive results for EHV 1, 2 and 5 were obtained, as shown in the table below. In the first sample, 1 horse was positive for EHV-1, 8 were positive for EHV-2, and 11 for EHV-5. One month later, 4 horses were positive for EHV-1, 12 for EHV-2, and 11 for EHV-5. At the final sampling at two months, none was positive for EHV-1, but 6 were positive for EHV-2 and 10 for EHV-5.

Detection of Virus Types and Subtypes
at Santa Anita and Hollywood Park Racetracks
(n = 16)

	EHV-1	EHV-2	EHV-5
Initial sampling	**6.25% (1/16)**	**50% (8/16)**	**68.75% (11/16)**
Sample at 1 month	**25% (4/16)**	**75% (12/16)**	**68.75% (11/16)**
Sample at 2 months	**0**	**37.5% (6/16)**	**62.5% (10/16)**

The identification of only herpesviruses, which are well known for their ability to establish latent infections, is consistent with the respiratory disease-free status of the cohort of horses tested. And, the percentage of horses in this study infected with EHV-2 (75%) is comparable to the results obtained in other studies. However, the proportion of horses in Dr. Bell's racetrack study infected with EHV-5 was higher than previously reported. To our knowledge, this is the first report of EHV-5 infection of horses in North America.

The consistent detection of EHV-2 and 5 in nasopharyngeal swabs collected from this population of horses, as well as the sporadic identification of EHV-1, illustrates the dilemma often confronted by clinicians who are faced with interpreting the significance of such positive results. While EHV-1 is universally recognized as a cause of febrile upper respiratory disease, and occasionally pneumonia, the pathogenic importance of EHV-2 and 5 is hotly debated. While some studies suggest that these cell-associated herpesviruses may be causative agents of respiratory disease in horses, their ubiquitous presence in the equine population precludes accurate determination of the significance of a single positive PCR result. EHV-2 and 5 are gamma-herpesviruses, members of the same herpes subfamily as Epstein-Barr virus, the cause of

infectious mononucleosis in humans. The symptoms of mononucleosis, which include pharyngitis, fever, enlarged lymph nodes, and malaise, are strikingly similar to clinical signs in horses that are purportedly associated with EHV-2 infection. Additional studies are clearly needed to define the pathogenic significance of the gamma-herpesviruses in horses.

The sporadic presence of EHV-1 in the nasal secretions of the clinically normal horses that were sampled in this limited study is also noteworthy, as it further indicates that identification of this virus is not invariably associated with disease. The specificity of molecular testing for the other respiratory viruses examined in this study is confirmed by the negative results for these viruses in this group of clinically unaffected racehorses. Dr. Bell expects, then, that these assays should be useful for the rapid diagnosis of outbreaks of respiratory disease in horses caused by equine rhinitis viruses, influenza, and EHV-4.

While this initial study has provided new and useful information, it raises almost as many questions as it answers for the veterinary practitioner and client trainers. It does establish the credibility of molecular testing as a viable tool for the analysis of respiratory disease outbreaks and provides a basis upon which further diagnostic progress can be made. In Dr. Bell's words, "It marks the beginning, rather than the end for me. I expect to be pursuing this matter for some time to come."

So next time you're at the track, don't be surprised to find Dr. Bell in a horse's stall chasing viruses!