Response of Horses Exposed to *Sarcocystis neurona* When Monitored Biweekly

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The incubation period of equine protozoal myeloencephalitis may be highly variable and horses may not always develop clinical signs after confirmed exposure. Horses appear to require other risk factors in addition to exposure to *Sarcocystis neurona* in order to develop clinical signs. Repeated exposures may be protective. Authors’ addresses: College of Veterinary Medicine, Depts. of Veterinary Preventive Medicine (Saville and Morley) and Veterinary Clinical Sciences (Reed), The Ohio State University, Columbus, OH 43210-1092; Gluck Equine Research Center, University of Kentucky, Lexington, KY, 40546-0099 (Granstrom); and College of Veterinary Medicine, University of Tennessee, Knoxville, TN, 37901 (Andrews). © 1997 AAEP.

1. **Introduction**

   Equine protozoal myeloencephalitis (EPM) is the most common neurologic disease of horses at The Ohio State University Veterinary Teaching Hospital. *Sarcocystis neurona* is a protozoan parasite that appears to have an affinity for the central nervous system in horses. Little is known about the pathogenesis of EPM. The youngest horse reported to have been diagnosed with equine protozoal myeloencephalitis was 2 months of age. Transplacental infection has not been reported, which suggests that the minimum incubation period may be less than 2 months. Experimental infections resulted in clinical signs in 28 days. Previous investigations indicate that the onset of clinical EPM may be influenced by stressful events, which may include pregnancy, lactation, poor nutrition, weather, transport, heavy training, foaling, and so on.

   Thus the incubation period may be quite variable. The purpose of this study was to examine the consequences of natural exposure to *S. neurona* by following horses over a 1-year period.

2. **Materials and Methods**

   Forty-four horses were stabled at a farm for varying amounts of time (<1–10 years). All horses were examined for evidence of neurologic disease, and Western blot analysis was performed for detection of antibody to *S. neurona* in serum. Approximately 80% of the horses were seropositive at the outset of the study, and the six seronegative horses were included in further investigations. These six horses were examined biweekly and samples of serum and cerebrospinal fluid (CSF) were obtained at those times. No changes were made to the management of the horses after initiation of the study.
3. Results
All horses developed a serum antibody response to S. neurona within 20 days of initiation of the study, except one horse who became seropositive at 7 weeks. All horses remained seropositive 50 weeks after initiation of the study, and four horses were seropositive at 67 weeks. Examination and sampling on week 93 revealed that three horses were seropositive and two were seronegative. One horse that was seronegative at week 67 was seropositive at week 93. None of the horses developed clinical signs of EPM and none developed an intrathecal antibody response during the study. On several occasions, the IgG index was higher than the reference range (0.14–0.24) when the CSF antibody to S. neurona was negative.

4. Discussion
Prolonged serum antibody response to exposure to Sarcocystis has been demonstrated in other species.9

The presence of S. neurona antibody in serum for the long periods in these horses was likely due to either a high initial antibody titer, persistence of the antigen in this aberrant host, or perhaps frequent re-exposures to the parasite.

The reason that the CSF indices were persistently elevated in these study horses is unknown. Perhaps there is an age effect on CSF indices. Previously published reference values for CSF indices were determined with horses 9 years of age or younger.10,11 The horses in this study were 9 to 22 years of age. However, persistent biweekly sampling may also have caused inflammatory changes in the subarachnoid space and the dura. The introduction of novel antigen during the cerebrospinal fluid collections also may have influenced these changes. Because none of the horses developed clinical signs, the significance of an elevated IgG index is poorly understood.

The prevalence of EPM has been estimated to be approximately 1%.9 However, previous investigations have shown that there is a much higher exposure rate to S. neurona.12 Horses that are frequently being re-exposed to the parasite may develop protective immunity. Evidence that these horses may have been previously exposed includes the amount of time that these horses were exposed to the same farm environment prior to initiation of this study, the high seroprevalence on this farm, the length of time the serum antibody was detectable, and the fact that one horse became seronegative and subsequently seropositive. If re-exposure is occurring, as we suspect from our study, perhaps this may be protective and may explain why none of these horses developed clinical EPM. Such a phenomenon may have strong implications toward the development of an effective vaccine.

This study also suggests that the incubation period of EPM can at times be long, perhaps greater than 1 year in some cases. It is possible that horses in this study have not been exposed to the necessary stresses or risk factors required to produce clinical disease. This study also shows that care should be taken when interpreting the CSF indices. However, much more epidemiologic information is necessary to design effective control programs for the prevention of this disease.

References and Footnotes

Granstrom DE. Gluck Equine Research Center, University of Kentucky, Lexington, KY 40546 (personal communication), 1997.