

Equine Protozoal Myeloencephalitis

EPM is the most common neurological disease in horses

Overview

Equine protozoal myeloencephalitis (EPM) is a progressive and potentially fatal neurological disease in horses. It is caused by a protozoal (single cell) microorganism, most commonly *Sarcocystis neurona*, which causes inflammation in the brain and/or spinal cord.

Opossums, the primary intermediate host in the life cycle of *S. neurona*, excrete parasite oocysts (akin to an egg) in their feces, which subsequently develop into sporocysts (infective spores). Horses become inadvertently infected when they ingest the sporocysts while grazing. The sporocysts migrate from the horses' gastrointestinal system via the blood and lymphatic system, across the blood-brain barrier, and take up residence in the central nervous system.

EPM is the most common neurological disease in horses. It is estimated that approximately half of all horses have come in contact with the parasite and have antibodies in their blood against *S. neurona*; however, not all horses that ingest the sporocysts become infected or develop clinical signs. In fact, the incidence of EPM (i.e., annual number of U.S. horses that develop disease) is thought to be less than 1%.

In horses that do become infected, the sporocysts can damage any region of the brain or spinal cord. As a result, the clinical signs of EPM are remarkably varied and usually asymmetrical (worse on one side of the body). Signs can be as mild as a slight decrease in performance to severe signs such as narcolepsy, seizuring, and collapse.

EPM can look like a variety of other neurological diseases, including wobbler syndrome (cervical stenotic instability), West Nile virus, the neurological form of equine herpesvirus-1, rabies, and Eastern or Western equine encephalitis.

Master of Disguise

Four tests are currently available for diagnosing EPM: Western blot (immunoblot)



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test, a DNA-based polymerase chain reaction (PCR) test, an indirect fluorescent antibody test (IFAT), and an ELISA (enzyme-linked immunosorbent assay) test.

While these tests each have their attributes, none is perfect. This makes diagnosing EPM challenging. When performed on serum samples, the Western blot, IFAT, and ELISA simply indicate if a horse has been exposed to *S. neurona*, but do not directly provide proof the horse is currently infected. Positive results from these three tests on cerebral spinal fluid (CSF) samples (the fluid that bathes the brain and spinal cord) assist in raising the suspicion that the horse in question has an active infection; however, these tests are not 100% definitive. This is because antibodies can migrate between the blood and cerebral spinal fluid, and if even a small amount of blood contaminates the CSF sample during collection, the test result is questionable.

The PCR test detects genetic material from *S. neurona*. If the parasite damaged the spinal cord or brain and was

subsequently cleared by the immune system, the horse can still exhibit clinical signs of disease, but will no longer have detectable parasitic DNA. Therefore, even a negative test does not mean the horse does not have EPM.

According to EPM experts, the Western blot remains the gold standard.

Treatment

Once other neurological diseases have been ruled out and the results of diagnostic testing are indicative of EPM, three Food and Drug Administration-approved treatments for EPM are currently available to choose from. You should consult your veterinarian before undertaking any treatments.

Marquis (15% ponazuril) is administered orally once daily for 28 days. The product is available in calibrated dosing syringes and each syringe is appropriate for a 1,200-pound horse for seven days.

ReBalance, a combination of sulfadiazine and pyrimethamine, is available in an oral suspension formulation. This product is administered daily for 90 to 270 days.

Navigator (32% nitazoxanide) is available as an apple-flavored oral paste that is administered once daily. The product is packaged in a dispensing box containing 26 syringes, a body weight tape, and a treatment diary. With this product, the horse is initially administered a half dose for the first five days before the carefully calculated full dose of 22 mg/kg for the duration of treatment (23 days).

In addition to these drugs, infected horses are sometimes treated with non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, dimethylsulfoxide (DMSO), vitamin E, folic acid, and/or complementary and alternative therapies.

Prognosis

Early diagnosis and treatment are key factors to achieving an acceptable outcome. In aggressively managed cases a complete

or near-complete recovery is expected in 60-70% of cases. The prognosis can be worse depending on where the parasite damages the central nervous system.

Prevention

Prevention is primarily aimed at avoiding exposure of horses to opossums and opossum feces. This involves preventing opossums from gaining access to pastures and barns. A comprehensive study (*Journal of the American Veterinary Medical Association*, 2000) revealed the following findings that help us more effectively prevent EPM:

Age The highest risk of infection occurred in horses aged 1-5 years. This could be due to the use of young horses in competitive situations and the associated stress.

Opossums Presence of opossums on a farm posed an increased risk.

Location Horses on farms with previously infected horses had a higher risk of developing EPM, likely due to the presence of protozoa in the feed or water.

Seasonal effects Fewer EPM cases occur in winter, possibly related to hot weather acting as a stressor and more travel the rest of the year.

Stress An association of stressful events (such as injury, accidents, foaling, surgery, transport, and illness) with increased risk might be related to suppression of a horse's immune system.

Natural water source Presence of water sources (creek or river) on the farm provided a preferred habitat for opossums away from the horse barns, thereby *decreasing* exposure and risk.

Food storage Securing feed and water sources from opossum fecal contamination is important to limit exposure and risk.

It is important to limit opossum presence since sporocysts are able to survive for as long as a year in the environment. Also, birds feed on insects and plant material in the feces of opossums and can disseminate sporocysts in the environment. It isn't easy to kill the parasites in the environment, and sporocysts are resistant to even the most intense disinfectants. Steam cleaning in a barn is about the only way to kill the parasite.

In 2008 Florida researchers reported that oral ponazuril (20 mg/kg) administration once every seven days might prevent EPM following exposure to *S. neurona*. 🐾

FAST FACTS

- EPM is most often caused by the parasite *Sarcocystis neurona*.
- Horses become infected by ingesting opossum feces contaminated by *S. neurona* oocysts.
- The parasite can penetrate the central nervous system and cause neurologic signs such as a change in performance level, incoordination, weakness, head tilt, muscle loss, narcolepsy, seizuring, and collapse.
- Diagnosing EPM is challenging largely due to the lack of reliable tests.
- Three FDA-approved treatments for EPM are Marquis, ReBalance, and Navigator.
- In general, prognosis is good; 60-70% of horses recover post-infection with appropriate treatment.
- Prevention strategies focus on preventing contact between horses and opossum feces.
- Once weekly administration of ponazuril might aid in EPM prevention in horses exposed to *S. neurona*.

Are you looking for an EPM testing service with greater reliability of results?

Q: How do you find out if your clients' horses are infected?

A: Our service detects *S. neurona* antibodies through the use of Western Immunoblot. Most EPM-infected horses recover if the disease is diagnosed early and treated appropriately.

Neogen Compared to Other Labs

Features	Neogen	Other Labs
Quantitative Results	✓	
Western Blot Method	✓	✓
2-day Guaranteed Results	✓	✓
Albumin Quotient (AQ)	✓	✓
Total Protein	✓	
Cytology	✓	
CSF Index (AG & IgG)	✓	✓
24-Hour RUSH Service Available	✓	✓
Previous Sample Comparison	✓	✓
Free FedEx® Shipping	✓	

Please contact us for further information, technical support or to order your FREE EPM Test Request Forms.

FREE test to new users during June.



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