



EXERTIONAL RHABDOMYOLYSIS (TYING-UP) IN HORSES

The Educated Horseman: Disease Series

Spring is upon us, and many horse enthusiasts are taking advantage of the longer days and are riding more. It is important, however, to ensure your horse is fit enough to endure the level of activity you are participating in to reduce the incidence of injury.

Equine exertional rhabdomyolysis (ER), often referred to as "tying-up," or "Monday morning disease" is a prevalent muscular disorder in horses characterized by reluctance to move, muscle pain, stiffness, and in severe cases, muscle breakdown, significantly impacting a horse's performance and overall well-being. While exertional rhabdomyolysis can occur in any horse following strenuous exercise, certain breeds and genetic factors are predisposed to this condition.

Exertional rhabdomyolysis involves the breakdown of muscle fibers causing the release of a protein found in heart and skeletal muscle called myoglobin into the bloodstream. This can cause inflammation, pain, and in severe cases, kidney damage due to myoglobinuria (the presence of protein in the urine) with dark brown urine. The condition can be caused by a variety of factors, including intense exercise, electrolyte imbalances and metabolic disturbances.

In horses, two forms of ER have been identified: sporadic and recurrent. Sporadic ER can occur in any horse due to intense exercise without proper conditioning. Recurrent exertional rhabdomyolysis is more commonly due to genetic predispositions.

Two of the most common genetic conditions related to ER are polysaccharide storage myopathy and recurrent exertional rhabdomyolysis.



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Polysaccharide storage myopathy (PSSM)

PSSM is a genetic disorder causing an abnormal accumulation of sugar in muscle cells. Horses with PSSM often exhibit signs of ER, especially following exercise. PSSM is caused by a mutation in the GYS1 gene, which encodes for the enzyme glycogen synthase. There are two forms of PSSM: Type 1 and Type 2. Type 1 PSSM is associated with the GYS1 mutation, while Type 2 PSSM does not have a clear genetic cause but presents similar clinical signs.

GYS1 Mutation and PSSM Type 1: The GYS1 mutation leads to an overproduction of glycogen, resulting in the abnormal storage of polysaccharides in muscle cells. This condition is more common in breeds such as quarter horses, warmbloods and draft horses.



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Recurrent exertional rhabdomyolysis (RER)

RER is another form of ER that is often seen in thoroughbreds, standardbreds and Arabians and is not linked to abnormal glycogen storage but is related to abnormal calcium regulation within muscle cells during contraction. While specific genetic markers for RER have not been definitively identified, studies indicate thoroughbreds are more commonly affected by this condition.

Management and Prevention

Effective management of ER involves a combination of dietary and exercise strategies targeting improved muscle function and reducing risk muscle breakdown.

Dietary management

- **Low-starch, high-fat diets:** Horses with PSSM benefit from diets low in nonstructural carbohydrates and high in fat. Reducing starch intake helps to prevent excessive glycogen storage, while added fat provides an alternative cool energy source for muscles.
- **Electrolyte supplementation:** Working with your veterinarian to ensure that your horse is maintaining adequate electrolyte balance is crucial to maintain proper muscle function and preventing ER, especially in horses that sweat excessively during exercise.
- **Vitamin E and selenium supplementation:** Antioxidant supplementation with vitamin E and selenium may help to reduce muscle damage and support muscle recovery in horses with ER. Care should be taken when formulating this part of your horse's ration. Check with your veterinarian to ensure appropriate levels are achieved as too much supplementation can cause toxicity issues.

Exercise management

- **Consistent exercise routine:** Horses prone to ER should have a regular exercise routine with gradual increases in intensity. Sudden, intense exercise should be avoided to reduce the risk of muscle damage.
- **Warm-up and cool-down:** Active warm-up and cool-down periods are essential for horses with a history of ER. These practices help to prepare muscles for exercise and prevent sudden shifts in muscle metabolism.

Equine exertional rhabdomyolysis is a complex condition influenced by both genetic and environmental factors. Ensuring that your horse is fit enough for the intended activity, providing appropriate nutrition and electrolyte supplementation is essential to reduce the occurrence of RER. Understanding the genetic predispositions, such as those associated with PSSM and RER, allows for more targeted management and breeding strategies. While genetic testing and careful management can significantly reduce the incidence and severity of ER, veterinary intervention may be necessary in severe cases to reduce lasting effects.



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