

# Tying-Up in Horses

*Tying-up, aka exertional rhabdomyolysis, is a common equine muscle disease often caused by PSSM*

## Overview

Exertional rhabdomyolysis, more commonly referred to as tying-up, is a muscular disorder (rhabdomyolysis means destruction of skeletal muscle cells) occurring in horses either during or immediately after exercising. Classic signs of horses that are tying-up include stiffness, sweating, muscle fasciculations (tremors) and reluctance to move as a result of painful muscle damage.

The large muscle groups in the back, pelvis, and hind limbs—such as the lumbar, gluteal, semimembranosus, and semitendinosus—are most often involved and are firm and painful. In rare cases the muscles in the forelimbs and shoulders are affected.<sup>1,2</sup> Severely affected horses can also have elevated heart and respiratory rates and appear anxious or colicky. In contrast, mild cases of tying-up can be challenging to diagnose because the horse might only seem stiff, “off,” or lame. Very infrequently, in severely affected horses, massive muscle damage can occur, which leads to kidney failure and death.<sup>1,2</sup>

Other terms for tying-up include azoturia, set fast, Monday morning disease, or paralytic myoglobinuria.

## Causes of Tying-Up

Tying-up occurs either unexpectedly/sporadically or it can be a chronic, ongoing, and frustrating problem. Sporadic exertional rhabdomyolysis is potentially caused by such factors as:

- Overexertion (exercising beyond the current level of conditioning).
- Sudden changes in training regimens.
- Exercising in hot, humid conditions (potentially related to electrolyte imbalances).
- Dietary issues. Diets high in soluble fibers (high grain diets), low in selenium/vitamin E, electrolytes and/or minerals.
- A recent history of a viral respiratory tract infection (influenza).



Tying-up is commonly used to describe horses that are stiff, sweaty, and reluctant to move due to muscle pain.

■ Gender (high-strung/nervous fillies and mares appear to tie up more frequently than males) and hormonal imbalances.<sup>1,2</sup>

Unlike sporadic cases of tying-up, recurrent or chronic episodes are most frequently caused by an underlying heritable condition.<sup>1</sup> One of the most well-studied and common causes is polysaccharide storage myopathy (PSSM) which is an abnormal accumulation of glycogen (a polysaccharide) in skeletal muscles. Quarter Horse and draft-related breeds are among the most commonly affected breeds. One cause of PSSM is a genetic mutation in the gene called glycogen synthase 1 (GYS1) that results in the overproduction of glycogen in muscle tissues. However, other causes of PSSM are suspected and are currently being studied.

## Diagnosis

Recognizing a horse that is tying-up is generally straight-forward, based on

history and clinical examination findings. Routine blood tests typically identify considerable increases in muscle-specific enzyme levels such as creatine kinase (CK) and aspartate aminotransferase (AST). CK levels return to normal within three to seven days whereas AST levels can take up to 14 days to normalize. Monitoring enzyme levels after an episode helps establish a diagnosis and helps one decide when it is appropriate to resume exercise.

Determining the underlying cause of tying-up, however, is more challenging and involves either seeing how the horse responds to changes in diet and exercise or additional diagnostic tests, such as muscle biopsy.<sup>3,4</sup>

Like any disease, it is always important to distinguish a suspected tying-up episode from other, more serious musculoskeletal conditions such as a fracture, laminitis, or neurological diseases. Signs associated with the accidental ingestion of poisonous

plants or other toxins can also be similar to exertional rhabdomyolysis.

### Treatment

If you suspect your horse is tying-up, stop exercising the horse immediately and place him/her in a stall and call your veterinarian. Affected horses should not be moved, walked, or exercised. Place a blanket on your horse if the weather is cool and offer small amounts of water frequently.

Since there are multiple causes of tying-up, there is no one single treatment plan. In general, treatment goals are to relieve pain and anxiety, correct fluid and electrolyte imbalances, and to minimize the risk of kidney damage. These goals can be achieved via fluids therapy (oral or intravenous), administering a sedative such as acepromazine, and a pain-reliever such as phenylbutazone. Dimethylsulfoxide (DMSO), and/or dantrolene might also be indicated, depending on the case.<sup>2</sup>

Once a horse begins to move pain-free, small paddock turnout is recommended, followed by small increases in activity to resume regular levels of work. Some

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horses with chronic tying-up (PSSM particularly) are kept active even when their muscle enzyme levels are above normal as total rest seems to exacerbate signs of muscle stiffness.

### Prevention

Specific preventive strategies will vary depending on the underlying cause. For horses suffering from chronic or recurrent tying-up, these are some ways to help prevent episodes:

- Maintain a regular exercise regime and increase training gradually, not abruptly.

- Establish a daily routine for young, high-strung fillies to minimize stress, and modify the diet to include a balanced vitamin

and mineral supplement.

Feed high-quality hay with minimal grain and sweet feed, and increase the amount of fat fed (in the form of vegetable oil, for example).

Acepromazine can be used daily at low doses in stressed or nervous horses that tie-up frequently and dantrolene can be fed to fasted horses one hour prior to exercise to potentially prevent an episode. Daily oral administration of phenytoin has been advocated, but can cause drowsiness depending on the dose. Each of these options requires a prescription from your veterinarian. 🐾

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### KEY RESOURCES

1. McKenzie EC, Firshman AM. *Optimal Diet Of Horses With Chronic Exertional Myopathies*. *Vet Clin North Am Equine Pract*. 2009;25:121-135.
2. Valberg SJ, Hodgson DR. Exertional Myopathies in Horses. In: Smith BP, ed. *Large Animal Internal Medicine*. Philadelphia, Penn: Mosby; 2002: 1285-1290.
3. Oke S. "Genetic Mutation for Polysaccharide Storage Myopathy Widespread." [www.TheHorse.com/12725](http://www.TheHorse.com/12725)
4. Oke S. "Polysaccharide Storage Myopathy: Blame It on the Genes." [www.TheHorse.com/11654](http://www.TheHorse.com/11654)

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