

# Tying-Up in Horses

\* By Dr Stephanie Valberg, from Equine Disease Quarterly, October 2002

Tying-up, the most common muscle problem in horses, has also been called azoturia, paralytic myoglobinuria, and chronic exertional rhabdomyolysis (ER). Clinical signs include sweating, stiffness, and reluctance to move forward. Tying-up is not a single disease, but a collection of clinical signs that may have different causes in each horse. Specific causes for tying-up have recently been identified, and more are on the research horizon.

Sporadic tying-up is seen in horses that have always exercised normally but suddenly exhibit signs of this muscle problem. It can be due to: exercise in excess of training level, exhaustive exercise, respiratory infections, lack of dietary selenium/vitamin E, or lack of dietary electrolytes and minerals. These horses usually recover with rest, adjustment of the diet treatment, and gradual return to exercise, going on to perform successfully.

Other horses have a chronic form of tying-up from a very young age with continual problems even when exercised lightly. This syndrome has been described in many breeds and can have different causes. A thorough investigation into the cause of tying-up in these cases is necessary and requires the cooperation of the horse owner/trainer and veterinarian, often in consultation with a veterinary medical specialist. A work-up for tying-up involves evaluation of urine and serum electrolytes and minerals, measurement of muscle enzymes released into the serum pre-exercise and four hours post-exercise, and evaluation of muscle biopsies.

One cause of chronic ER in Quarter Horse-related breeds, Draft horses, and Warmbloods is a metabolic defect called polysaccharide storage myopathy (PSSM). This defect is the most common cause of ER in Quarter Horse and Draft-related breeds and appears to be inherited. Horses with PSSM store an excess of glycogen in their muscle. Muscle secretions stained with Periodic Acid Schiff's Stain show that a proportion of the glycogen is stored in an abnormal fashion and is not available for energy production. Horses with PSSM have a greater sensitivity to insulin, which likely increases transport of sugar into the skeletal muscle after a carbohydrate meal. The exact link to muscle necrosis is not clear but may be related to disruption of the balance of energy metabolism by excessive muscle glucose 6 phosphate. The lactic acid level in these horses when they are tied up is actually very low. Treatment of horses with polysaccharide storage myopathy involves supplying them with feed that maintains low blood sugar and low blood insulin concentrations (no grain, with a fat source such as rice bran) combined with regular daily exercise.

Stall rest or irregular exercise may cause another episode of tying-up. Over 90% of horses will improve dramatically and return to full athletic performance if the recommended changes in diet and exercise are followed.

Other breeds of horses may tie up for completely different reasons. Current research indicates another cause of tying-up exists in Arabian, Standardbred, and Thoroughbred horses that is related to an abnormality in the way the muscle cells regulate intracellular calcium during a muscle contraction. It may involve a genetic predisposition. This form of tying-up, called recurrent exertional rhabdomyolysis (RER), is not related to dietary calcium intake. Five percent of racing Thoroughbreds, especially young, nervous fillies, are affected. Energy metabolism and glycogen storage appears to be normal in RER horses. Muscle stiffness usually occurs when exercise and excitement combine, such as at a horse show, after a steeplechase, or when horses are being held back to a slower pace than they desire. In Standardbreds, tying-up often occurs after 15 minutes of jogging. The approach to treating these horses is to minimize excitement and stress and substitute fat supplements containing rice bran for part of the grain ration.

Research continues in order to develop the best diagnostic tests and treatments for the variety of forms of tying-up in these breeds.