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# EQUINE BACK REHABILITATION

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There is much more to a proper treatment regimen for equine back problems than solely the aspect of medical treatment. To achieve long-term positive results, clinicians need to recognize the importance of follow-through rehabilitation factors, including training or retraining of the horse. Truly resolving a back case and helping to prevent its recurrence by a whole-horse approach is challenging and interesting. This approach can also be immensely more gratifying to the clinician as well as to the client. It is only possible to scratch the surface of this topic in a single article, but this information can serve to highlight important considerations.

Rehabilitation needs to consider restoring function to the entire axial skeleton muscles in order to keep the back functioning properly.<sup>1, 15</sup> The horse's back is central to the function of the musculoskeletal system and to its ability to carry a rider. Biomechanically, the head, neck, back, and hindquarters are connected and move together (Fig. 1). A hollow position of the neck and back alters the position of the pelvis, making it impossible to engage the hindquarters correctly. The rectus abdominus, iliopsoas, tensor fasci latae, and rectus femoris muscles (protractor muscles of the hind limbs) must contract to allow proper use of the back. Contracture of the longissimus muscle lowers the back, decreasing the motion in the vertebral column. The contraction of the abdominal muscles raises the back and allows the longissimus muscle to lengthen and contract selectively, which, in turn, frees the back to move.

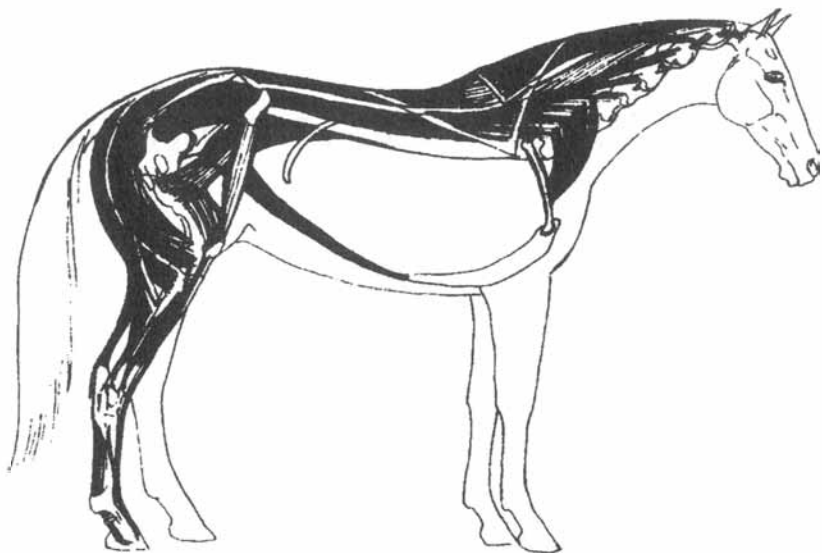
## MANAGEMENT FACTORS THAT INFLUENCE REHABILITATION OF BACK PAIN

### Shoeing

It is not uncommon for many sore-backed horses to have significant shoeing imbalances. The authors also recognize the variation in the abilities of farriers.

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**Figure 1.** Important muscle structure forming a continuous circle from the head, down the back, hindquarters and up the abdomen to the neck. (From Harris SE: *Horses, Gaits, Balance and Movement*. New York, Howell Book House, 1993; with permission.)

Rehabilitating back problems with farrier assistance requires an extra effort at good communication between clinician and farrier. The farrier must be well equipped, skilled, educated, and open to innovative ideas. It certainly behooves a veterinarian to find a farrier with whom he or she can work well in order to produce good results.

A common shoeing balance problem that needs to be addressed early in any rehabilitation program is the "long-toe, low-heel syndrome." The many problems created by this altogether too common fault are well known but are worthy of periodic review by all clinicians. The relation of long-toe and low-heel shoeing to painful back conditions arises from components of the "posterior heel syndrome." Chronic heel bruising is often a part of the picture. The horse that has sore heels or chronic tendon or ligament strain in the posterior aspect of the leg assumes a posture of an "elephant standing on a ball," with the front legs slightly drawn back to alleviate tension and discomfort. Even then, tension is held in the back muscles to help support the limbs. The back progressively loses suppleness and flexibility, a situation that continues to a state of muscle strain and pain.

The current balancing methods of shoeing advocated by master farriers such as Dave Duckett, Rick Redden, Tony Gonzales, Moses Gonzales, and Gene Ovnick are all variants of a four-point trim. They all employ a diagonal form of balancing from quarter to opposite heel instead of just front-to-rear and side-to-side balancing. In the authors' experience, when a four-point balance is properly achieved, heel support and appropriate toe length can often be accomplished within two shoeings.

If the heel of one front foot is significantly lower than the other front heel,

this situation can create a back problem or prevent an injured back from healing. When this condition has existed for a long period of time, asymmetrical changes in the contour of the back occur. This scenario, of course, has major implications for saddle fit and rider balance.

The muscles on the caudal aspect of the shoulder on the side with the lower front foot heel become hypertrophied (infraspinatus, deltoid, thoracic portion of the trapezius, and thoracic portion of the rhomboid muscles). On the high-heeled side, there is usually hypertrophy of the cranial (ascending) pectoral muscles. These muscle changes obviously mean that the horse is using the two forelimbs differently. Another change that is observed when the heel of one front foot is significantly lower than the heel of the other front foot is the different angles exhibited in the right and left scapulohumeral joints. Additionally, the point of the shoulder is more caudally displaced on the lower heel side.

Examination of the limb also reveals different scapulae angles and, consequently, different relative positions of the dorsal most aspect of right and left scapulae when the back is viewed from above. Due to this different angle, the dorsal most aspect of one scapula appears to be lower than that on the other side. Asymmetry and position differences can best be viewed from a position that is behind and above the horse. These asymmetries can cause the saddle to slip to one side or twist in a manner so that it becomes impossible for the rider to sit in balance. It may be likened to driving a car with a bent frame.

In rehabilitating the horse's back, it is imperative that the muscles be retrained and brought into a balanced state in order for the rider to be correct on the horse. To accomplish this, orthotics or various forms of equalizing the heel heights are utilized. These may include a wedged pad or wedged shoe, or a trim angle correction on the lower heel side. Attempts at lowering the higher heel usually are not productive; even though appearing to be improved immediately after shoeing, the foot is seen to revert back to its original unequal state by the end of the shoeing period. Orthotics also have use in the hindquarters for the purpose of altering abnormal posture and retraining muscles to create balance. These may include wedges to alleviate strain at the lumbosacral junction or lifts in the form of rim pads to alleviate strain in the sacroiliac joints or ligaments.

The farrier must understand that the focus of these specific forms of shoeing is to help the back problem. Farriers sometimes perceive that the veterinarian is telling them how to do their job. It is helpful if the farrier understands that if the problem with the horse's back is not corrected, the horse may not be ridden and the owner may cease having the horse shod at all.

Orthotic shoeing is best preceded by and made more effective with rehabilitative work that addresses the muscle tension and imbalances as well as spinal segmental dysfunction issues present in the back. Such therapies for this purpose might include any of the following: chiropractic, acupuncture, massage, laser, infrared photon, ultrasound, microcurrent, and heat.

The patient must be put into at least light work for the orthotic shoeing to have an appreciable effect; that is, the muscles must be in work in order to retrain them. If large pastures are available and the horse tends toward self-exercise, these circumstances may provide the work necessary to bring about the required changes in muscle balance. It takes time for balance to occur, and an occasional patient may become stiff or sore during the transition. These cases need to be monitored, but one should not jump to conclusions and remove the orthotics too quickly.

## Turnout

Maintenance of a healthy back involves more than in-hand or under-saddle exercise. In the author's experience, horses that receive no turnout or minimal turnout are more prone to back injuries as well as to many other potential injuries to limbs. The arguments and debate for absence of turnout (especially in dressage horses) are well known to the authors, but it is the authors' firm belief that horses that are properly warmed up and stretched before free turnout are far less prone to injury.

The horse is simply not physically designed to live its life in a box stall. Horses that spend significant time outside in some form of turnout also suffer less emotional stress. Stress creates tension in muscles, making all structures more prone to injury. The options to move freely (without weight on the back), to lie down, to roll at will, and to perform at gaits of the animals' own choosing are all performed in a natural state of balance; as such, they are vital in maintaining spinal suppleness and flexibility.

## Training Devices

There are only a few truly bad training devices used to assist in creating balance in the horse under saddle, but there is an inordinate amount of bad use of these devices by well-intended riders and trainers. Improper use can create a problem in the back or prevent an existing problem from resolving. Items that take this "bad rap" include devices such as side reins, the chambon, the gogue, the French back lift, running or draw reins, standing martingales, and tie-downs. Used properly, they are of great benefit in strengthening the ventral musculature. Without the strengthening of muscles involved in spinal and pelvic flexion, the horse cannot collect and properly engage.

The category of training devices affecting posture and balance (and thereby the back) also includes bits. The most severe of bits can be excellent in the hands of a skilled rider. In the hands of a rider who cannot bring the horse into balance by using the driving and carrying forces emanating from the hindquarters, even the so-called "innocuous" broken snaffle can create a back problem or prevent an existing back problem from healing.

Improperly used training devices and artificial head sets can contribute to back pain by forcing the horse to hold its body in an unnatural posture for an extended period of time. If these devices were appropriately used in short intervals with a rest period provided between sessions, the muscles would not become fatigued. When the horse's body is constantly held in one position with various training devices, as the primary muscles fatigue, the horse compensates by using other parts of its body incorrectly, and is more susceptible to injuring these structures.

Clinicians need to be able to refer a riding rehabilitation case to a truly knowledgeable rider or trainer. A metaphor to the adage "if you do not know jewelry, know your jeweler," would be "if you do not know rehabilitative riding, know the trainer's qualifications."

## Correction of Compensatory Lameness

Many lameness problems of the lower leg can be traced to problems originating in the horse's back. For example, when using thermography, it is common

to see an area of decreased circulation in the lumbar or gluteal muscles with the diagonal front leg showing an apparent injury. If the front leg is treated but the back problem is not resolved, the front leg injury may become a chronic problem.

## Teeth and Mouth

The importance of mouth comfort for the horse cannot be overemphasized in evaluating and correcting back pain. Mouth pain can both mimic and cause back pain; the horse avoids the pain by raising its head, which causes extension of the back. As soon as the back tightens and drops, the cycle of tension leading to pain begins. When the horse is relaxed in its mouth, it becomes possible for the animal's back to relax and maintain proper posture and balance.

The teeth need complete dental assessment and care to complement the rehabilitation of back problems. The work must include completely smoothing the sharp edges along the sides of the molars and premolars as well as performing a bit seat and removing all hooks or ramps from the front and rear of the arcade. A bit seat is the rounding of the second premolar on both the top and bottom so that a bit of any style only contacts a smooth rounded surface.

Bite realignments should be performed conservatively when the incisors are showing uneven wear. Bite realignments are needed more commonly in areas of the country where grazing is limited or when the horse receives minimal turnout with little chance to eat grass and wear its teeth naturally. In a limited grazing situation, the incisors elongate slightly, causing increased pressure in the last molars and decreased pressure in the premolars and allowing the premolars to lengthen. The temporomandibular joint can become extremely sore, potentially causing secondary back problems. The authors have also seen horses' temporomandibular joints become sore after excessive bite realignments, so caution is recommended.

## Working Surfaces

The type of ground that the horse works on has an important influence on back problems. Footing that is adverse or is substantially different than that to which the horse is accustomed can create muscle soreness, as the back muscles are used to compensate for adverse or varying conditions. This is especially true when the footing used on a daily basis is fairly firm and the footing at a competition or race is deep or soft. In this case, the horse's muscles are well adapted to the firm footing but have not become trained or accustomed to the deep or slippery footing.

New riding arenas and resurfaced racetracks are some of the worst offenders. There is not space in this article to discuss the pros and cons of the various surfaces for each equine-related sport, as the requirements for the different sports vary. Riding surfaces need to drain well and not become dangerously slippery when wet. The materials available for footing in different parts of the country vary, so it is important to observe the successes and failures of surfaces for similar sports in the local area. New materials, especially different types of rubber mixes, are being used, often quite successfully. Some of the rubber tire material used for arena footing may have environmental toxicity problems, as the tires leach heavy metals and chemicals into the environment and may contaminate the water supply.

## **Adverse Training and Maintenance Factors**

Muscles need to be warmed up and warmed down properly to prevent soreness.<sup>7, 16, 19</sup> "Cold" muscles are more prone to injury, and most riders ignore the importance of this. Twenty minutes of slow work (walking and trotting at the beginning and end of exercise) brings the temperature of the muscles to an appropriate physiological exercising temperature and aids in clearing the metabolic wastes after exercise. As a side benefit, the horse is likely to be more mentally relaxed and easier to ride.

Longeing and round pen work can cause excessive strain to the back muscles, because the horse is moving in the same direction in a small circle, often for an extended period of time. Under such conditions, the horse often bucks or twists and moves in a tight circle at the same time. When horses buck and play naturally, they do not travel in a tight circle; that is, their natural movement is forward and fairly straight. Moving in the same direction continuously fatigues the small pastural muscles. As the small muscles become fatigued, the larger less refined muscles are used to compensate.

### **Longeing**

Horses are often longed for hours at shows to calm them. After the initial few minutes when they might buck or play, they are asked to perform the same movement (usually a trot or canter) for an extended period of time. Muscles then become fatigued, which can contribute to back injury. Often, round pen work is done with young unconditioned horses that are much more likely to injure themselves. Young horses often tend to panic when started in round pen work. If the footing is deep or loose, they frequently slip and slide and do not pay attention to the footing. These factors can all contribute to back injuries.

### **Ponying**

In most instances, ponying a racehorse causes the horse to travel with its back twisted. The racehorses are young and fresh, and they often canter sideways with the pony rider holding the racehorse's head tightly to control the animal. The torque placed on the spine by this practice leads to many chiropractic-related problems, not to mention the extreme forces that are placed on the lower legs while the horse is moving in this twisted position. Ponying on a loose line as is commonly done with polo ponies does not cause the same torque of the spine.

### **Hot Walkers**

Many mechanical hot walkers force the horse to walk with its head and neck up, encouraging an extended back position. Racehorses, especially after exercise, should stretch their neck and back muscles and not contract them. The new "caged" walkers, where the horse is not tied but allowed to be exercised in a "moving pen," are a much more muscle-friendly way to use a mechanical walker, because the horse's head is free and the neck and back can stretch.

## Swimming Programs

The use of swimming to condition horses for athletic events is contraindicated to developing good back muscles; however, swimming can be a great tool if used judiciously during the rehabilitation of an injury when nonweight-bearing exercise is needed. A horse swims with its head and neck up, its back extended, and its front legs pulling through the water. These postures use a different set of muscles than those used when the horse is being ridden.

## Blanketing

Blankets that are too tight cause the horse to shorten its stride and compensate for that shortened stride throughout the rest of the body. Horses often wear ill-fitting blankets for weeks without a break or with only a short break while they are being ridden. Blankets that are cut back or too large around the neck can have a dart placed in the shoulder to pull the blanket forward on the neck so the shoulders are free.<sup>11</sup> Pressure from the blanket over the withers can cause the horse to drop his back slightly, decreasing the distance between the spinous processes and potentially increasing the problem with impinged spinous processes. Blankets that twist across the horse's back place a constant torque on the spinous process.

## REHABILITATIVE AND MAINTENANCE EXERCISES

### Stretching

Many clients are capable of participating in their horse's recovery by following a regular stretching program. Safety consciousness and proper technique are critical when performing stretching exercises; a careful explanation of form and awareness is important.

Proper leg and body muscle stretching can be a most valuable tool in alleviating a painful back and in prevention of recurrence. There would be far fewer medical, chiropractic, and acupuncture cases presented in both man and horse if a regular program of stretching were followed.

The horse's body should have some warm-up prior to undertaking stretching. This can be accomplished by 5 minutes of walking in hand. A primary rule to follow when stretching is performed is to slowly apply gentle traction and wait for the horse to voluntarily relax the muscle. The client should never pull hard or quickly, especially when initially stretching a muscle. That causes the horse to pull back, initially and the animal then only tightens the muscle more and does not relax it.

The person assisting the horse to stretch can accentuate softness by slowly exhaling while releasing the tension. Legs can safely be stretched in almost any direction in which the horse is comfortable moving them—as long as no sudden or strong force is used. The body segment should be stretched only until resistance is encountered. Many horses have been injured by overzealous stretches that ask for more lengthening than the horse can accomplish. A bad stretch is worse than no stretch. If the stretch is maintained for too long, the horse may try to end the stretch either by retracting the limb or by forcing his way through the stretch in order to get the limb back on the ground. Initially, holding the stretch for 8 to 10 seconds is adequate. Each stretch should be

repeated three times. It helps if the limb is allowed to relax between stretches. With each repetition, it is common to see the limb or muscles lengthen an additional small amount.

"Belly lifts" are a valuable form of body muscle stretches and are an excellent way of isometrically strengthening the abdominal muscles. The effects are similar to those of sit-ups for a human. In the horse, the stretch especially affects the thoracic portion of the spine as far back as the thoracolumbar area, but it also has some action on the cervical and the lumbar vertebral regions.

The epaxial muscles must be capable of relaxing in order to be stretched; thus, massage and warm-up may be required before doing the belly-lift. It is also ideal to have the horse's head level with or lower than its withers. The lift is triggered by running a finger, or a plastic device like a needle cap in some cases, along the midline to reflexively contract the rectus abdominus and pectorals. The force required to trigger the reflex can vary considerably from one horse to another; thus, one should start with a gentle stimulus and increase the stimulus as necessary. Belly lifts should be done regularly as a part of a grooming or handling session. Performed too frequently, asking for too many repetitions, or using too much force may cause the horse to become irritable and unwilling to allow you to continue. Many horses cannot raise their backs and need to be treated with chiropractic or acupuncture before they can tolerate this exercise. A horse should not be forced to do these lifts, although small gentle movements can be tried on a regular basis to loosen the thoracic girdle muscles.

A variation on the standard belly lift that is beneficial to the back is the sideways belly lift. Here, the person assisting reaches down across the horse's midline approximately where the girth lies and hooks the fingers into the opposite side of the ventrolateral thoracic wall. The direction of pull is up and towards the assistant's nose or towards the side of the horse's withers. This stretch cannot be done by all horses; a significant number have chiropractic problems that are painful when this stretch is performed. Nevertheless, this is an excellent exercise for freeing up the cranial part of the thoracic spine, and the movements generated by it correspond to the lateral movements required in many sports.

Stretching through the lumbosacral area can be reflexively stimulated by applying pressure bilaterally in the groove between the semitendinosus muscles and the biceps femoris muscles at the level of the "root" of the tail. Thumbnail pressure or simultaneously applying pressure with a hypodermic needle cap held in each hand works well to trigger the stretch. On most horses, it works best to apply the pressure with a stroking motion from a few inches cranial to the tail root and ending at a point level with the tail root. The pressure required varies from horse to horse, and the safety of the person assisting with the stretch must be considered. The horse may not feel comfortable enough to allow the stretch until pain in the lumbosacral area is alleviated.

"Carrot stretches" in which carrots or other feed items are used to coax the animal to bend laterally or ventrally are a way of moving the spine through most of its normal range of motion and stretching the muscles at the same time. A carrot can be held by the horse's flank or between the front limbs. A normal horse can easily reach its hip and stifle as well as reach quite far caudally between its forelimbs. The carrot can be held in any place the horse can reach as long as the stretch is comfortable and the horse does not have to twist into an uncomfortable position. If a horse cannot perform this type of stretch easily, he may need chiropractic or acupuncture care.

There are caveats to consider when using carrot stretches. In order to effectively stretch the upper cervical vertebral region, the horse's head should



remain level while lateral flexion is induced. To effect this with "treats," the foodstuff must be held at approximately mouth level or even at eye level. Holding the carrot at the level of the horse's elbow induces the horse to laterally flex its neck. Some neck stretches benefit the lower cervical area muscles more than the upper cervical area muscles.

When one asks the horse to reach between the forelegs while holding the carrot too close to the animal's sternum, the horse flexes excessively at the poll and brings the neck to the chest in a manner that "jams" the lower cervical area. To make this an effective stretch, the horse's back should first be raised with the belly lift; only then should the horse be asked for the neck stretch while the back is raised. This produces a true "bascule" in which the neck is stretched forward and down as the thorax is lifted between the forelegs.

One must be careful when using treats to induce the stretch to insure that the horse's movement is fluid and not jerky. There is a tendency for the horse to repeatedly lunge or jerk his head for the food even though it may not be comfortable in doing so. This does more harm than good. It is also difficult to get the horse to hold the stretch for a therapeutic amount of time. Another problem is the tendency for the person assisting to ask the horse to stretch farther than the horse is comfortable in doing. With food as an inducement, the horse often still attempts to stretch in spite of pain, but potentially to its detriment. An excellent source of information on stretching is the videotape by Nancy Spencer, an equine kinesiologist, entitled "Basic Equine Stretching" ©1993 Equitronics Productions.

## IN-HAND AND UNDER-SADDLE EXERCISES

### Posture Correction

Posture, stance, and conformation are functions not only of the actual bony structure but also of how the muscles are holding that osseous structure together. If there is weakness in some muscles and tension in antagonistic muscles, imbalances that may be interpreted as conformational faults can be detected.

Poor back posture is often blamed on poor conformation when the undesirable shape is actually due to muscle pain and tension. Back muscle pain produces a poorly developed top line, atrophy of the top line, weak muscling through the loins, prominent tuber sacrale, "swayback" or lordosis, prominent withers with poor muscling, poor gluteal muscle development, uneven shoulders, and often poor neck muscle development with more ventral neck muscle development ("ewe neck"). When the back pain is removed and remedial exercises are performed, the back changes shape, although not always to a perfect shape; however, muscling becomes more symmetrical, the muscles fill out, and the bony landmarks are less prominent.

Accompanying the improvement in posture, there is generally more "fluid" movement, because the more relaxed the muscles are, the more fluid the joint motion is. Decreased range of motion in the joints is often associated with muscle hypertonicity, particularly that of the back.

To assess posture and back shape, the stance of the horse at rest should be observed; many horses develop a compensatory positioning of the legs when pain is present (antalgic stance).<sup>10</sup> Some horses stand stretched out or "parked out" to rest their backs, although others stand with all their limbs underneath their bodies. Shoeing should be assessed, because unbalanced feet lead to alterations in stance and to back pain. The observer should determine whether the

horse always rests one foot or places one foot in a certain position and whether the horse can stand squarely on all four feet if asked. The horse should be observed from all angles to assess symmetry, including the angle obtained when the observer stands on a stool above and behind the horse.<sup>10</sup> Many horses observed from above and behind have asymmetrical shoulders, which may relate to shoeing imbalances.

Postural correction, improved proprioception, reduction of back pain, and improvement in performance occur best with a selected combination of all the modalities discussed in this article. As the horse's posture and the appearance of the back improve, performance problems usually also improve. Specific exercises can be used to speed the recovery of posture abnormalities and to correct movement.

### Muscle and Posture Rehabilitative Exercises

Exercises that allow the horse to properly use its back are keys to strengthening the back as well as to prevention of recurrence. Implicit in rehabilitation is a good working knowledge of kinesiology and physiotherapy principles. An understanding of the term *balance* or *equilibrium* is essential. When balance exists, muscles work synergistically with one another. When learning to walk or to ride a bicycle, far too many muscles were used; many of the muscles employed were inappropriate for the task and caused us to fall. As we became more skilled, fewer muscles were used and the muscles that came into play were used in a complementary and efficient manner. The training of the muscles, which at first required our full concentration, progressed to a high degree of coordination and became noncognitive. The work of Jean-Marie Denoix and Jean-Pierre Pailloux<sup>6</sup> can provide veterinarians and trainers with much help in this area.

Rehabilitation exercises in hand and under saddle may also require retraining riders so that they recognize their role in creating back problems. Riders need to learn preventative warm-ups and exercises. Equitation that produces physical or emotional stress must be identified and corrected. Without addressing rider problems, treatment and rehabilitation efforts for the horse may well be in vain. There is nothing more frustrating for a clinician than to effect a wonderful recovery only to have the rider recreate the problem with, for example, an ill-fitting saddle or through serious riding faults. It is also important that riders look at the state of their own spinal health and other physical problems. For example, riders with bad backs or scoliosis can create or recreate back problems in their mounts. The authors have often suggested that a rider also get proper body therapy if his or her horse is ever to come "sound" and have a hope of staying so.

In-hand work can often be started as soon as other causative factors such as foot balance, mouth pain (from bits or dental problems), and improper tack fit have been addressed. In-hand exercises can and often should occur concomitantly with other therapeutics and physiotherapies such as massage and stretching.

Critical to such work are exercises that re-educate proprioception and the appropriate neuromotor response from the highly proprioceptive muscles with more muscle spindles such as the deeper postural paraspinal muscles. These postural muscles are far more richly innervated than the larger dynamic muscles (more type II fibers) that generate propulsion. In referring to the critically innervated postural muscles, Denoix and Pailloux<sup>6</sup> describe them as being the

muscles that "respond to the rider's subtler commands." They function critically in proprioception and muscle "learning."

The smaller deeper muscles (more type I fibers) that create fine tuning are recruited first and are also more prone to fatigue than the larger propulsive muscles with low-intensity exercise. Exercises continued for too long fatigue the small muscles; spinal movement becomes less refined and sets the stage for muscle or ligament injury.

It is important that the patient not be in a stressed state when doing rehabilitative exercises in hand or during rehabilitative exercises under saddle. Stress and fear cause the large propulsive muscles to "take charge" and reduce proprioceptive awareness. This is the "freezing-up" reaction that most of us experience in tense situations. Pain or psychological stress can cause the dorsal muscles of the back to contract, producing extension of the spine that we observe as "hollowing of the back," which is the opposite response from what is required to maintain a pliable and healthy back. Generally speaking, muscle activation from "fright and flight" reflexes is counterproductive to rehabilitation. These muscles include the masseter muscles in the jaw, the sternocephalic and brachiocephalic muscles in the neck, the trapezius muscles, and the extensors of the spine such as the longissimus and iliocostalis muscles as well as the gluteal muscles and hamstring muscle group of the hindquarters.

Proper exercises and a relaxed mental state allow the hypaxial muscles to be strengthened and maintain appropriate tone while the epaxial muscles are more relaxed, allowing the spine to flex. Specificity of exercises depends on the location and severity of the problem and as such is beyond the scope of this article. The reader is referred to the work of Denoix and Pailloux.<sup>6</sup>

Lowering of the neck in all gaits causes flexion of the thoracic spine, along with stretching of the epaxial muscles (the longissimus and iliocostalis muscles). This posture adds to the workload and subsequent strengthening of the abdominal muscles as well as the raising of the chest between the muscular sling of the thoracic girdle.

Muscles that need to be strengthened in these exercises include the superficial and deep pectorals, subclavius, internal and external obliques, and rectus abdominus.

This stretching and strengthening is particularly therapeutic for horses that suffer from impinged or overriding spinous processes in the midthoracic vertebrae. Flexion produces an increased distance between the tips of the dorsal spinous processes and lessens the pressure and pain of impingement. The tone created in the abdominal muscles by such exercise can then help to maintain open interspinous spaces and reduce painful contact.

Work in a chambon or similar western training device that is not tightly adjusted allows the head to be lowered to the level of the "knees" and does not engage the hindquarters. It is important to strengthen the neck and abdominal muscles before asking for significant engagement of the hindquarters. This first stage is essential, because the equilibrium necessary to all athletic use of the horse can only be achieved when there is a balance between the tone of the epaxial and abdominal muscles.

When the muscles of the abdomen have come into appropriate tone and the pain is lessened in the lower cervical and thoracic muscles, one can begin to recondition the lower back by bringing the neck up to the required riding position and asking for more propulsion (i.e., engagement from the hindquarters). Engagement and a longer stride produce lumbosacral flexion and stretching of the loin and croup muscles.

## Ground and Riding Rehabilitative Exercises

Exercises to achieve the desired results may best be started from the ground. During longe work, the side of the more significant back pathology and pain should be on the inside of the circle depending on the pathology present. An appropriate ratio would be 75% of the longe work with the pain side in flexion to 25% in the other direction. Longeing can be combined with various training devices such as the chambon, gogue, or carefully used side reins if one is skilled in their use. Work in hand may then progress to "long-lining," in which the horse is ground driven with two long lines.

Exercises should include backing ("rein-back"), initially asked for only on the flat and then later on an incline. Long-line work on a 20-m circle that is placed on a mild incline can be valuable for integrating more muscles and increasing proprioceptive responses. Frequent transitions are of value in creating balance. The transitions need to be made smoothly with the horse maintaining a natural posture and balance; that is, the horse should allow its head to remain in the same balance as is maintained in forward motion and not, for example, throw it upward in either upward or downward transitions. The halt should come from the hindquarters with lumbar flexion present.

Later, exercises to bring the neck to a normal riding position require more engagement of the hindquarters. After each halt, the horse should be immediately asked to back one or two strides while maintaining balance. As is the case in the transitions, the head posture should be willingly maintained and the body should stay collected and in balance. Eventually, "strike-offs" to the canter or lope can be undertaken while maintaining balance.

The countercanter is an excellent means of strengthening the intrinsic back muscles and is particularly valuable in strengthening the lumbosacral coupling. The countercanter must be undertaken only after the back has been reasonably developed. Initially, it should be done only on a large circle no smaller than 20 m and should not initially be maintained for more than one or two circles (voltes). An excellent countercanter exercise can be performed on a large figure-eight pattern. One half of the figure-eight pattern is performed with the horse on the correct canter lead, and the other half is done with the horse in counter-canter. As in all exercises, it is also important that the horse be in a state of balance or equilibrium during the countercanter to prevent conflicting muscle actions.

When designing exercises, one must also consider peripheral limb problems such as shoulder, hock, or stifle problems. Rehabilitative exercises can only progress at the rate of strengthening the weakest link. One must also bear in mind that problems in the limbs may be related to radicular neuropathy in the spine or that a peripheral limb problem may induce back problems. An approach that does not encompass a full consideration of this interconnectedness is not as effective as a whole-horse approach.

## Tellington Touch Equine Awareness Movement Exercises

Tellington Touch Equine Awareness Movements (TTEAM) for horses was formally founded in 1978 by Linda Tellington-Jones as a result of her studies with Dr. Moshe Feldenkrais, who taught a system of human body awareness through the use of nonhabitual movements to retrain the body and mind through reorganizing the nervous system.<sup>8</sup> A group of exercises and techniques was organized into a systematic method of educating and re-educating horses.

Later, Tellington-Jones developed a series of tactile techniques employing small circular movements on the body that were easy to use and could be taught quickly.

One of the greatest benefits of TTEAM work has been to help teach eye-to-hoof coordination and postural correction through nonhabitual movements. It has been the experience of these authors that problems with proprioception and eye-to-hoof coordination can best be addressed with TTEAM exercises combined with other appropriate therapies. With TTEAM and its various "Touches," horses learn to release the pain and tension cycle; in many cases, as the tension disappears, so too does the "learned" pain. Many of the exercises teach eye-to-hoof coordination, helping to correct posture and balance. A few of the exercises that the authors have found beneficial are described below, but much more detail can be found in numerous books and videos.<sup>22</sup>

TTEAM leg circle exercises are done by holding the limb in a relaxed position similar to that employed when cleaning out the hoof. Four or five circles are made in each direction with the limb, starting with small circles which get larger as the limb loosens up. Hip joints are frequently tight, and as the gluteal muscles are the primary muscles of propulsion, it is important to keep the hip joints flexible. Horses can learn balance, eye-to-hoof awareness, and how to release muscle tension in the upper body by performing this nonhabitual exercise.

All of the TTEAM ground exercises can be performed in hand if the horse is unable to be ridden, or they can be performed under saddle after the exercises have been taught in hand. A tool used frequently as an aid in these exercises is called a "wand," which looks like a 4-ft dressage whip. Its use is that of an extension of your hand and arm; thus, the name "wand" was used to give it a positive connotation. The wand is stroked across the horse's body or tapped on the feet to help the horse become more aware of the differentiation of its body parts. As the horse goes through the exercises, the wand is used as a guide whenever the horse is having difficulty or a specific cue is needed.

One of the most important TTEAM exercises for the rehabilitation of the back is the head-lowering exercise. A high extended neck translates into a lordotic painful back. For this exercise and most TTEAM exercises, a leadline chain is used across the halter noseband, not for forceful handling but rather to give subtle commands or signals. The horse is given a gentle but firm tug and release signal to lower the head. After some practice, most horses lower their heads easily just from a slight signal or voice command.

Taking the horse in hand through a labyrinth (maze) using specific signals and commands is an excellent way to develop the horse's balance, coordination, and thinking processes. The labyrinth is constructed from 12-ft poles constructed of either wood or plastic pipe. The animal is led through the labyrinth slowly, often only one step at a time in the beginning. To teach balance and focus, the pace is varied a little bit, but the horse is never allowed to rush through the maze. By watching facial expressions and body language as horses maneuver through the labyrinth, they can be observed thinking their way through the exercise.

The "pick-up sticks" exercise is a simple way to teach eye-to-hoof coordination, although some horses need to learn other exercises first before they can perform this one. Poles are placed at random in a pile with enough room left between the poles for the horse's foot to be placed safely. The handler guides the horse as the animal walks through the pile one step at a time, placing each foot differently.

The "star" is an exercise that requires the horse to simultaneously execute different movements with each side of its body. Poles are placed on a bale of hay (or single cavalletti may be used) in a curve, with one end situated high on the bale and the other on the ground. As the poles are negotiated, the horse must lift the inside leg higher than the outside leg.

Some horses can learn balance and coordination by putting an elastic bandage or rope around their body in a figure-eight pattern, with the bandage or rope going across the chest and over the back. In TTEAM ground-driving exercises, ropes are used across the chest to ground drive the horse rather than a traditional bridle and reins. Hindquarter impulsion, a natural head set, and proper neck and back posture are encouraged by using the chest ropes.

## **Training and Retraining**

The topic of training could easily cover books twice this size, but a few principles of training can be applied across all sports. One of the biggest problems facing most equine-related sports is the overuse of young horses. Economically, trainers and owners believe that they are ahead if the horses are fully trained when they are 2 to 4 years old. Horses are not physically or mentally mature until they are 4 or 5 years old; consequently, those that are ridden at a younger age need to be ridden more carefully. For endurance sports, horses do not reach their peak of fitness until they are 8 or 9 years old. Horses that are worked too hard when young tend to break down more easily and are rarely seen as good performance horses later in life. The back is one of the first areas to suffer when horses are worked too young. Training of younger horses can be done if the workload is introduced slowly and reasonably and if the owners or trainers do not get caught up in trying to compete too frequently.

Cross-training is a common phrase used in the realm of human athletics, but it is rarely heard in the horse industry. Cross-training is nothing more than engaging in different types of training so that the athlete is better able to perform his sport.<sup>3</sup> In the horse industry, examples of cross-training would consist of galloping a dressage horse up hills to develop its hindquarters and fitness, doing basic ring work and teaching balance to a trail horse, or riding a reining horse over difficult footing to teach coordination. Not only do the horses improve in their respective sports because they have more fit muscles to draw on if fatigue occurs, but the mental attitude of the horses is much more positive because they get bored doing the same work every day. Horses that are cross-trained are generally more brilliant performers because they enjoy it more.

Fitness appropriate for the sport and for the level of competition is extremely important to the health of the horse's back. If the horse's back becomes fatigued while the horse is carrying the rider, the back becomes susceptible to injury and tends to become extended, leading to more pain. If the legs become fatigued, the horse compensates with its back. Interval training can also be used in many sports as an effective method of increasing fitness.<sup>3</sup>

## **REHABILITATIVE PHYSICAL THERAPY MODALITIES**

### **Massage**

Riders or trainers can often be taught simple exercises that can be of significant value to the horse as a follow-up to medical treatment. This regime

can be referred to professional physiotherapists, but there is one simple technique of massage that can be mastered by the rider or trainer in a few minutes. This technique utilizes a tennis ball to apply massage to the epaxial back muscles, especially the thoracic trapezius, longissimus, and iliocostalis muscles. Also valuable to include in the massage are the large muscles of the croup and the muscles attaching to the tuber coxae. These would include the middle gluteals, the biceps femoris, the internal/external abdominal obliques, and the tensor fascia latae muscles.

Used properly, the ball produces cross-frictional massage, compression massage, and acupressure. The ball is used as an extension of the hand by grasping the ball and placing it against the skin in a manner such that the skin is "locked" to the ball. A pressure that is comfortable to the horse is then applied in a "kneading" manner; that is, the ball is twisted in a direction that is across the fiber pattern of the muscle being worked.

There are many good charts available depicting the superficial muscles. Copies of such charts marked with the muscles that the clinician would like massaged can be left with the client.

Clinicians should bear in mind that if they expect client compliance, any recommended exercise or procedure must generally be simple and easy to perform, not consume too much time, and be one that the clients feel they can safely execute. The clinician would do well to emphasize awareness and safety consciousness with the rider, owner, trainer, or parent who is going to do the follow-up work. The person doing the massage should ideally be standing on a stable object that allows his or her shoulders to be higher than the elbows and wrists. Working from the ground is like painting a ceiling (i.e., tiring to the neck and arms).

Good massage technique along with some caveats is important. The horse communicates the degree of pressure that it finds comfortable. It is imperative that the person doing the massage be attentive to the messages that the horse conveys. Although their muscles are much larger, horses require no more pressure than a human patient would be comfortable with. Massage pressure should start lightly and increase as the horse is able to readily accept more.

Caution must be exercised so as to not create a pressure that induces more pain than the patient is willing to tolerate. The client must be left feeling that what he or she is asked to do makes a difference. The client should also be informed as to how soon he or she can expect to see a difference; if such information is not supplied, the client may lose heart and compliance.

## Magnetic Therapy

Magnetic therapy can have useful application in the management of back problems, particularly by increasing circulation and decreasing pain. There are significantly different physiological effects elicited by positive magnetic fields and negative magnetic fields. The key to successful use lies in using the appropriate polarity for the stage of injury. Unfortunately, there is much confusion concerning the polarity markings on magnets. This confusion has led to mixed results and some unwarranted condemnation of their use.

The terms *positive polarity fields* and *negative polarity fields* need to be clarified. When materials are dissociated into their ionic components, the atoms of the ions are positive or negative depending on whether they have gained or lost electrons (negative charges) in the process of the dissociation. Positive charges exist when the atoms have lost electrons and create a positive field. Conversely,

negative fields occur when they have gained electrons through the dissociation and thus create a negative field. The earth's magnetic north has an excess of electrons; thus, there is a negatively charged field that attracts the positive (electron-deficient) pole of a compass needle or magnet.

Unfortunately, there are two methods of marking magnets. In the geophysical/scientific method of marking magnets, the north-seeking pole of a bar magnet is marked "N" for north. Much of the medical use investigation of magnets was conducted by Albert Roy Davis<sup>4,5</sup> and Dr. Richard Broeringmeyer.<sup>2</sup> These researchers marked their magnets in an opposite manner based on the principle that opposite poles are attracted to one another; in other words, *they marked the north-seeking pole of the magnet "S" for south*. Other medical researchers also followed this convention. The important thing to be able to determine is which end or side of the magnet is the magnetic north-seeking pole and to recognize that this pole of the magnet is positive.

Problems arise when magnets are sold with geophysical/scientific markings and the directions included are for using the opposite pole (biomagnetic) marking convention of Davis and Broeringmeyer. Poor therapeutic results frequently occur in this situation. Therefore, it is critical to truly understand which polarity is being applied to the tissue.

It is a simple matter to determine which is the magnetic north-seeking pole or south-seeking pole of any magnet with the aid of an inexpensive compass. The magnetic north-seeking compass needle is attracted to the north (negative) magnetic pole of the treatment magnet. This end (or side) of the treatment magnet should then be marked as *negative*. Using this convention instead of relying on "N" or "S" markings avoids the confusion between the two systems. Then, one only needs to know the medical indications for negative pole therapy or positive pole therapy. There are no differences between the therapeutic values of magnets of either nomenclature once the polarity is understood.

Thus, a negative polarity field (the field around the negative pole of the magnet) exhibits increased negative ion concentration. Therapeutically, negative ion concentrations increase oxygen in cells and act to relax muscle tissue and decrease pain. If one studies the available research, there are indications of many additional therapeutic benefits to be derived from this negative field.

The magnet's positive ion concentration (field) at the positive pole (the pole that repels the compass needle) has application in the early stages of trauma and in reducing swelling and edema in soft tissues. This positive polarity should not be used in the face of infection. Overuse of this pole can actually delay healing and increase pain over the site. In general, after treatment for the first 4 or 5 days with positive polarity, one should switch to the negative polarity (the pole of the magnet that attracts the north compass needle).

To further confuse the issue, magnets that are a mixture of positive and negative fields and are referred to as bipolar are also sold. The authors find these to be of value for short-term treatment during the acute stage of soft tissue injuries. Used for long periods of time, however, they have the same cautions or even contraindications as positive field magnets.

Magnet strengths are measured in gauss. Noel Norris indicates that for therapeutic use, magnets of high-gauss strength should be used and produce better and more consistent results.<sup>20</sup> According to Norris, typical measurements for good therapeutic magnets should be in the 6000- to 9000-gauss range as measured in "closed circuit" or in the 2000- to 3000-gauss range with the "open face" measurement. Open-faced measurements made with a gauss meter are more applicable, because that is the strength of the energy field at the point of application.



The need for more research is certainly clear. Nevertheless, one should not overlook the beneficial benefits of magnets in the treatment of back problems.

## Heat and Cold

Hot and cold therapies are easy to use, effective, and underutilized in treating back problems. Clients can make a hot compress by placing a damp towel in the microwave oven, by placing a heating pad over a damp towel, or by placing a towel in a bucket of hot water. The towel should be changed every few minutes as it cools. For most chronic back pain, moist heat is one of the best simple therapies, as it improves the circulation (decreased circulation is a significant part of back pain). Ice massage can be used on specific areas of muscle spasm and swellings caused by ill-fitting saddles.

## PROGNOSIS

The prognosis for treating back problems can be excellent. Unfortunately, the inadequate level of riding skill of many riders and the misguided methods of some trainers are factors beyond the clinician's control and can rapidly undo the best efforts. Just turning a horse out to pasture for a long rest is ineffective; the problem generally returns after the horse is put back into serious work. When horses with back problems are not actively treated with the different modalities available, these cases can be extremely frustrating.

In most cases, satisfactory results are forthcoming. In fact, many horses treated using the methods discussed in this article actually return to a higher level of performance than previously achieved.

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