



Dysafferentation and Meridian Imbalance

In my work as an equine acupuncturist I come across many sports medicine cases where the horse is in a position of compromised movement, which either hasn't deteriorated to the extent of an obvious injury or a previous injury which still has an effect on the smooth coordinated movement in the body. In this article I will try to dig into the concept of dysafferentation and meridian imbalance which are terms used in western and eastern medicine respectively to explain why smooth coordinated movement is effected even if there is no obvious injury present. By doing this I hope to communicate to horse owners the importance of acupuncture and it's potential for growth in the field of sports medicine as a way to improve conditioning, performance and diagnosis, which will prevent further injuries and not just be a method of treating them.

Dysafferentation

Dysafferentation is a term used to describe the neuropatho- physiological effects of a joint complex dysfunction that act to generate symptoms such as pain and reduced range of movement. The term 'dys' basically means abnormal and 'afferent' is a nerve carrying a message to the central nervous system from the body. Therefore the abnormality of these afferent fibres causes changes in both resting and working states of muscles which effects joints and thus the movement of the body. To explain the structure of this system we first need to look at the nociceptors located in the body which start the cascade of events which lead to the abnormal movement.

Nociceptors

These sensory receptors involved the dysafferentation process are located in different tissues of the body such as muscle bellies, muscle tendon junctions, joint capsules and the skin. They have a high threshold of activation and only overt stimulation can depolarise them, however tissue chemicals such as prostaglandin E-2, leucosin, bradykinin, histamine 5-hydroxytryptamine and local tissue acidity cause muscle and joint nociceptors to become extremely more sensitive, such is the case commonly with joint injuries. Nociceptor sensitisation then causes hyperexcitability and altered neuronal processing in the spinal cord and brain and thus abnormal afferent input = Dysafferentation.

Muscle Spindles

One type of nociceptor involved in afferent input is the muscle spindle; these gather and send information about the rate of change of muscle length. The fibres from the spindle are involved in spinal cord reflexes that modulate muscle function such as the stretch reflex, recurrent inhibition, reciprocal inhibition and the cross extensor reflex, which all play a vital role in smooth coordinated movement. They are located in greater numbers in muscles involved in fine movements and posture than with gross movement, therefore a horse trained to compete in a dressage event would have developed increased amounts of muscle spindles in muscles associated with more precise and targeted movements.

Golgi-tendon organs or GTO's

These nociceptors play an important opposing role to the muscle spindles, they regulate muscle tension and are stimulated when muscle contraction generates tension in the muscle. Once stimulated the fibres from the GTO's enter the spinal cord and excite interneurons located in the spinal cord grey matter. Once these interneurons are excited they inhibit the fibres from the muscle spindles which cause the muscle contraction and tension. To inhibit the GTO fibres there is convergent input from fibres from muscle spindles, cutaneous and joint receptors.

As part of the dysafferentation system the cerebellum and cerebral cortex regions of the brain are responsible for the proprioception which involves monitoring the afferent input and producing motor efferent output for movement.

The problem of dysafferentation primarily occurs in the nociceptors in the body where degeneration, atrophy and deconditioning of these structures in the muscle and joint structures become hypersensitive and feed inappropriate information to the central nervous system which in turn causes improper motor/efferent impulses into muscles that interrupts the smooth coordinated movement of the body and the condition of muscle hypertonicity.

Meridian Imbalance

To me as an equine acupuncturist I see the eastern concept of the meridian imbalance as it applies to sports medicine analogous to the western terminology of dysafferentation, it's just the explanation for how the two concepts work is different. Traditional Chinese Medicine is a fascinating form of medicine, it has so far offered many insights into the western world which has helped to improve knowledge all round. But what is the point of understanding the problem in western terms and then further understanding the problem eastern terms, it seems like once you learn English in an English speaking country there is no need for you to ever learn another language is there. The advantage of learning and understanding meridians and TCM is the fantastic advantage that acupuncture can give to getting results needed to improve smooth coordinated movement.

TCM and its applications to meridians and acupuncture points provide a methodology to analyse the reciprocal relationship of multiple joints and movement. These meridians which course through the connecting acupuncture points run vertically from the digits to the chest and head. One of the advantages of understanding meridians is that they provide a framework for understanding this reciprocal relationship of the multiple joints involved in movement.

The term 'kinetic setting' was explained to me by Mukaino Yoshito M.D in the book Sports Acupuncture, he explained it as 'joints that become fixed one after the other in movement' and the smoother the kinetic setting the more energy efficient the movement. Kinetic setting applies to the joints which lie along the path of meridians along the body. If one joint along a meridian is in dysfunction then the kinetic setting is affected along the entire length of the meridian.

The Triple Heater and Pericardium meridian imbalance is probably the most common of any meridian imbalance. Together they allow for extension and flexion of the forelimbs, the Triple Heater meridian permits unilateral flexion of the neck and the Pericardium permits unilateral flexion of the chest. Let's take a look at the meridians and the muscles and joints which they course through.

Pericardium Meridian

- Courses through the lateral chest, medial elbow, posterior knee and fetlock and the heel region of the foot.
- The main muscles the meridian courses through are the thoracic ventral serratus, caudal pectoral, subscapularis, middle carpal flexor and deep flexor muscles
- This allows the meridian control over the flexion of the forelimb and the unilateral flexion of the chest

Triple Heater Meridian

- Courses through the lateral eye, ear, neck and shoulder as well as the anterior knee, fetlock and foot.
- The main muscles the meridian courses through are the splenius, scalene, longissimus capitis, cervical ventral serratus, deltoid, lateral triceps and the common and lateral digital extensor muscles
- This allows the meridian control over the extension of the forelimb and the unilateral flexion of the neck

An imbalance between the two meridians can initiate a wide range of symptoms along the path of the meridian or its opposite pair. For example an issue causing contracture in the pericardium meridian such as heel pain will cause excessive extension in the triple heater meridian and thus pain and dysfunction along the anterior forelimb and lateral neck. When any joint from the knee down is flexed, the triple heater meridian is further stretched and pain and discomfort is initiated, even if there isn't any obvious symptoms in any of the associated joints. This reaction to flexion is enhanced in the colder months as the environment causes increased muscle contracture and thus enhanced meridian imbalance.

Common symptoms which can (and often do) develop from this imbalance include

- Heel and feet pain and dysfunction
- Fetlock and suspensory pain and dysfunction
- Knee pain and dysfunction
- Elbow pain and dysfunction
- Shoulder pain and dysfunction
- Neck pain and dysfunction
- Chest pain and dysfunction

Through the knowledge of acupuncture points and meridians we have a working and usable insight for treatment of cases of dysafferentation. This can give us insights as to why symptoms in the forelimb can cause hypertonicity, pain and dysfunction in the neck and how to apply treatment to the cause of the dysafferentation with reliable success. Through the interconnections of the 12 meridians in the body, understanding of meridian imbalance can also give important insights into symptoms manifesting in other areas of the body.

I see acupuncture as a leading form of both diagnosis and therapy in cases of dysafferentation and pain in the body. Primarily acupuncture is used to balance these meridians and improve kinetic setting to restore smooth movement which reduces stress on any obvious symptoms present. An awareness of this meridian imbalance can also give us insight into how we can modify training programs, improve shoeing and apply veterinary medicine to quicken and enhance treatment results.

If we go back to the example above, heel pain and bruising from bad conformation in the heel region. We can

- Use acupuncture balance meridians associated with the symptom and promote proper afferent setting
- Work the horse on softer footing to reduce stress on the heels
- Give more support to the heels with specific shoes
- Use veterinary medicine to improve blood supply to the feet and help strengthen and improve the health of joints effected associated with the heel pain

This information can apply to all areas of the horse industry from thoroughbred and harness racing to competition and pleasure and can be of great benefit to them. It helps to show that acupuncture is a serious measure to enhance performance through better understanding of issues such as kinetic setting and have a valid use as a treatment for these issues.