# The Effects on Meridian Function as a Result of Equine Hoof Balance

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**Keywords: horse; hoof balance; meridian function; applied kinesiology**

**Summary**

**Proper hoof balance has been shown to be critical to the musculoskeletal system; however, it has never been documented how hoof balance can also affect the viscerosomatic reflex of a horse. This report describes the findings of how improper hoof balance can affect the viscerosomatic reflex by excessive or deficient stimulation of acupoints in the distal limb of a horse. Twelve meridian energy channels were measured on 16 horses using applied kinesiology. Meridian function was measured at ting points and documented prior to and post application of the high performance hoof trim (HPT).**

## Introduction

It is well documented that hoof balance is known to be vital to the stride and optimal performance of a horse. Hoof imbalance is typically associated with quarter cracks, contracted heels, laminitis, and navicular syndrome.[1, 2] The purpose of this study is to demonstrate that hoof imbalances may also affect the viscerosomatic reflexes by improper stimulus to the energy meridians through acupoints located just proximal to the coronary band referred to as ting points.

## Materials and methods

Energy meridian function and neurovascular integrity were measured using applied kinesiology (AK) at the ting points of sixteen horses. Twelve meridian channels were measured: small intestine (SI), large intestine (LI), stomach (ST), spleen (SP), heart (HT), pericardium (PC), kidney (KI), bladder (BL), liver (LV), lung (LU), triple heater (TH), and gallbladder (GB). Measurements of each channel were documented prior to and post application of the high performance hoof trim (HPT).

### *Energy Meridians and Acupoints*

The term acupuncture point is Shu Xue in traditional veterinary Chinese medicine (TCVM). The word Shu describes a passing or communication, and the meaning of Xue is a hole or an outlet. When combined the description of Shu Xue is a hole in the skin
which communicates with one or more internal organs via a meridian or pathway. Disease is associated with too excessive, deficient, or obstructed flow of the vital energy (Qi) within a meridian.

Acupuncture produces multiple physiologic effects that appear to activate the body's homeostatic regulatory mechanisms.[3] The physiologic effects of acupuncture therapy cannot be explained by a single mechanism, but rather a series of interactions among the nervous, endocrine, and immune systems. Acupuncture points are thought to be located over subcutaneous areas where a nerve-vascular bundle has perforated the superficial fascia.[4, 5] Stimulation of acupuncture points has local, segmental (pain control and organ control), and central effects. The twelve energy meridians either initiate or terminate on the hands of a human, the paws of the canine or feline species, or just proximal to the coronary band in horses.

These most distal acupuncture points are command points, but referred to as ting points in equine TCVM. Each ting point is associated with a specific energy meridian and each meridian effects specific organ function and neuroemotional component of the specific organ (**Figure 1 and 2**). Stimulation of these points cause a biologic

response in the microcirculation and any other reactive acupuncture points along the effected meridian.

Diagnosis of a reactive ting point is done by applying the tip of the thumb to a ting point to determine the consistency of the tissue under each point. In acute conditions, the ting point will feel spongy or edematous and in chronic cases the ting point will feel like a dry hole. For the purposes of this paper, each meridian was measured for functionality at the ting point by applied kinesiology using manual muscle testing response. The function of each energy meridian was measured on a scale of 0-10 with 10 representing full function.

*Applied Kinesiology*

Applied kinesiology (AK) is a system of diagnosis revolutionized by Dr. George Goodheart in 1964 that utilizes the manual muscle testing response as a reflection of the status of the anterior horn motor neuron pool in the spinal cord. Weakness of a muscle or tissue being tested is caused by an inhibition of motor neurons located in the anterior horn motor neuron pool of the spinal cord.[6] The fundamental objective of AK is the evaluation and correction of nervous system irritation through the application of natural therapies designed to remove noxious irritants and restore normal neurological expression, thereby aiding in the promotion of health and the prevention of disease.[7]

According to Goodheart's observations, there are five factors or systems to consider in the evaluation of body function: the blood vascular system, the lymphatic system, the nervous system, the energy meridians and cerebrospinal fluid flow. He concluded that dysfunction anywhere in the body may be caused by a failure of any of these systems. AK allows the doctor to diagnose, through the use of the manual muscle testing response, the need for the application of a variety of sensory receptor based therapies such as acupuncture, nutrition, herbals and homeopathy, that when appropriately applied result in improved neurological function.

During the development of the AK technique for diagnosis, Goodheart became interested in the ancient Chinese art of acupuncture and, in 1966, published an article entitled, “Chinese Lessons for Modern Chiropractic”. Goodheart’s observations were:

> Needles were not necessary when using the acupuncture points for treatment. Digital (finger) pressure on acupuncture points was determined to be adequate stimulation to observe changes in neural pathways as measured by manual muscle testing.[8]

All AK techniques are about creating sensory receptor stimulation resulting in neurological excitation and/or inhibition leading to more optimal neurological function.[7]

## *Applied equine podiatry and the HPT method*

Applied equine podiatry is the study of the distal limb and evaluation of the horse’s conformation, biomechanics and environment. Conformation, discipline, environment, musculoskeletal balance and health of the horse will have a direct effect in the growth and wear of the hoof capsule. Understanding the specific function of each structure of the hoof is critical to balancing the equine hoof. In 1998, after extensive study of the function and dynamics of the seven hoof structures, KC La Pierre developed the High Performance Trim (HPT) method.[9] The trim is based on the internal arch and the hoof capsule being positioned according to the point of articulation of the bony column.

The location of the center of articulation has been a point of speculation. A common opinion is that the center of the coffin joint is 3/8” caudal to the apex of the frog.[10] This viewpoint is unreliable in cases of deformed hoof syndrome (DHS) when the frog may be artificially elongated. Another opinion dictates that the location of the center of the coffin joint is at the point where the bars terminate,[11] this is also an unreliable viewpoint in the event of an unhealthy frog or undeveloped bars. According to Gene Ovnicek and also utilized by La Pierre in the development of HPT method to balance a hoof, the most reliable method to locate the point of articulation is to map the foot.[9] To map the foot, a line is drawn down the center of the sole from the middle of the central sulcus through the true apex of the frog and extending to the most dorsal aspect of the toe. Another line is drawn medially at a 90-degree angle to the centerline to the widest part of the lateral wall, identified at the foot’s point of radius at the junction of the white line to that of the viable sole. The point of intersection of these two lines on the frog identifies the axis of the foot and its coffin joint. Dorsal/Palmar and Distal/Proximal balance is achieved by adjusting heel height to the same height of a healthy frog at its widest point (most palmar), and by adjusting the toe’s distal dorsal plane to that established at the heels.[9] Mapping the foot enables an Applied Equine Podiatrist to balance the hoof

capsule medial to lateral, dorsal to palmar, and distal/proximally on the distal plane. This places the coronary band in balance with the bony column and the point of articulation at the center of the coffin joint. The emphasis of the method is to create Dynamic Load about the entire circumference of the coronary band. Applied Equine Podiatry recognizes the importance of coronary band load, and how load relates to ungular cartilage function.

It is well understood by farriers and podiatrists that symmetry of the hoof should always follow the gold line (white line) with few exceptions. The gold line originates at the junction of the parietal and solar epidermis which migrates over the parietal integument attached to the coffin bone and from the distal margin of the dermal lamella. In this respect, the gold line is an excellent point of reference to establish symmetry of hoof. Exceptions using the gold line as a reference point for symmetry are DHS, mechanical stretch due to a long toe, and injury to the hoof capsule.

According to traditional farrier science, the dorsal hoof wall angle should match the pastern and shoulder angles.[14] This approach does not allow for incorrect conformation or pathologies that will affect these angles. Henry Heymering states in a paper on proper hoof wall angle, that the hoof angle seldom translates into distal limb bone alignment.[16] HPT guidelines suggest that the dorsal wall and heel angle match, with the rear of the heels being placed inline with the center of the third metacarpal bone, [9] this would result in the heel angle being relatively parallel to the dorsal hoof wall. Applying the HPT method, a podiatrist is forced to evaluate the whole horse and than map the solar aspect of the hoof. The importance of the solar purchase (surface area) of the heel is emphasized, this because of the relationship it plays to the appendage of the ungular cartilages. The Suspension Theory of Hoof Dynamics states that the heel to appendage interface is responsible for initiating distortion in the unshod foot. This in part will determine the load factors on the coronary band throughout the stride.[15]

Traditional farrier science also states that length of the toe and dorsal wall will be determined by the weight of the horse.[13] The HPT method recognizes weight as a stimulus, but encompasses other factors such as conformation, discipline and musculoskeletal pathology of the horse in addition to rider weight. This takes into consideration the distortion of the hoof capsule according to the environment. The HPT method also factors in toe height (distal/proximal) and length (dorsal/palmar).

## Results

A total of sixteen horses were used in this study: five mares, one stallion and ten geldings. This sample group is of different breeds and disciplines. Three of the horses were in the same location and environment and of good metabolic health. The remaining horses were all at different locations, environments, and rates of metabolic health. None of the horses were shod at the time of the study with the majority being unshod for at least two years.

Thirteen of the sixteen horses had 100% neurovascular integrity in all four feet. Of the three remaining horses, the neurovascular integrity was at 100% in the hind feet with variable neurovascular integrity to the front feet (**Figure 3 and 4**). All three horses were previously diagnosed cases of founder. The increase in vascular integrity would indicate a previous under stimulation of hoof capsule caused by an imbalanced hoof. Horse A and B were previously unshod and trimmed by traditional farrier methods. After applying the HPT method to attain a balanced hoof, vascular and neurological integrity increased (**Figure 3 and 4**). Horse C had been trimmed utilizing the HPT method for a duration of ten months and previously treated for metabolic imbalances.

As the data indicates, horses maintained with the HPT method for at least 10 months have optimal meridian function in 90-100% of the twelve meridian channels (**Figure C,F,G,H**). Horses trimmed by traditional methods had mediolateral and dorsopalmar imbalance that may have resulted in depressed meridian function (**Figures A,B,D,E,**). When the HPT method was applied, hoof balance was restored which resulted in increased meridian function.

## Discussion

In Goodheart's article, he sites that needles were not necessary when using the acupuncture points for treatment. Digital (finger) pressure on acupuncture points was adequate stimulation to observe changes in neural pathways. An energy meridian can be changed at any point along the meridian; however, the ting points are more sensitive due to the high degree of neurovascular bundles in this area. If a meridian is over/under stimulated, this may lead to increased or decreased function of an energy pathway. According to this study, changes in meridian function can be caused by a change in neurological stimulation and blood flow once the hoof is returned to a balanced state. Further studies of neurovascular integrity, meridian function and pain levels should be conducted to investigate the effects of trimming the chronically foundered equine hoof using traditional farrier methods versus the HPT method.

A balanced hoof can aid in the establishment of physiological equilibrium by not only affecting the musculoskeletal system but also the energy meridians which, in turn, affects the viscerosomatic reflex. Pressures placed on the coronary band that, as a direct result of hoof balance as indicated, appear to affect meridian function. The HPT method appears to be superior to other methods of hoof trimming by taking a whole horse approach, its emphasis on *Dynamic Loading* of the coronary band, and Internal Arch Apparatus may prove to be significant to the finding of this study. By addressing the whole horse, a more optimal environment for the maintenance or restoration of health can be achieved.

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