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## In This Issue

Peer Review Article: Applied Kinesiology Methods for Sciatica and Restless Leg Syndrome  
2010 Annual Convention Recap  
How Do I Perform a Self-Audit?

SF 2331 - Any Willing Provider/  
Chiropractor for HAWK-i  
Signed into Law.....pg 22

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# Applied Kinesiology Methods for Sciatica and Restless Leg Syndrome

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**Objective:** To present a single case study of a 78-year-old male with pain in his right lower lumbar region and radicular pain down his right leg. To present an overview of the muscular impairments found during manual muscle testing (MMT) evaluation that guided the interventions offered.

**Clinical Features:** The leg pain was exacerbated by restless leg syndrome and plantar fasciitis which had been present for over 30 years.

**Intervention and Outcome:** Chiropractic evaluation and treatment, and in particular applied kinesiology (AK)-guided chiropractic and nutritional evaluation and treatment were used for treatment of the numerous factors believed to be causing the symptoms. Following AK spinal and nutritional treatment, the patient showed significant improvement in his leg and foot pain and restless leg syndrome. The patient remained symptom free for seven years since the first five treatments.

**Conclusion:** The MMT procedures used guided the treatment methods employed. The patient noticed improvement after his first treatment and was symptom free within three weeks. No recurrence of symptoms was reported after seven years.

### Introduction

According to a growing number of studies, patients with low-back pain have lower mean trunk strength than asymptomatic subjects.<sup>1</sup> Restless leg syndrome (RLS) has a prevalence estimated to vary between 7.2% and 11.5% of the Caucasian adult population.<sup>2</sup> Because motor dysfunction, and specifically muscular inhibition, has been found as a common comorbidity associated with sciatica, plantar fasciitis, and restless leg syndrome, a reliable clinical tool for the diagnosis of this muscular inhibition is

desirable.<sup>1-2</sup> Poor motor performance is most practically assessed in the clinic using the manual muscle test (MMT).<sup>3-13</sup>

Applied kinesiology (AK) evaluates muscle function using the MMT, a diagnostic test that has shown reliability and validity for patients with muscle strength impairments.<sup>3</sup>

The use of MMT procedures is for three purposes in AK:

1. To aid in the diagnoses of structural, chemical, and/or mental aspects of health dysfunctions;
2. To offer the potential for shortening the course of treatments through "challenge" procedures (see Appendix);
3. To determine the effectiveness of treatments. In so doing, AK's testing methods were employed to indicate structural, chemical, or biopsychosocial disorders that may be associated with muscle strength impairments and guide the treatment given to the patient.<sup>3-4, 9-12</sup>

In AK, muscular dysfunction is thought to reflect neural function. First the Kendalls in the 1950s,<sup>11</sup> then Goodheart in the 1960s-1990s,<sup>12</sup> followed by many others who expanded the construct validity and the clinical usefulness of the MMT<sup>3-13</sup> because the recognition that muscular imbalance is a key characteristic of spinal and articular dysfunction. AK suggests that muscle function is a transcript of the central integrative state of the anterior horn motoneurons, summing all excitatory and inhibitory inputs.<sup>10</sup> In other words, the locus of muscular dysfunction ultimately rests with the nervous system.

AK is a diagnostic and therapeutic chiropractic technique that has gained peer-reviewed published support within chiropractic, medical, osteopathic, dental, biofeedback, acupuncture, veterinary and other health care literature.<sup>14-19</sup> AK manual muscle testing procedures have been described previously for the treatment of foot, pelvic and sciatic pain.<sup>20</sup>

### Clinical Features

The patient was an active 78-year-old male, 5'7", who indicated that for a

period of four months, he suffered from pain in the right hip, buttock, groin, lateral leg and calf. The patient also reported he had painful plantar fasciitis and restless leg syndrome (RLS) for at least 30 years previously.

The patient considered himself to be in good physical shape before the radiculopathy limited both his golf game and mountain climbing. The patient was able to hike and walk the golf course carrying his own golf bag up until the pain began and continued for four months. He then reported that during this time, walking longer distances and/or sitting too long exacerbated his pain to unbearable levels. The patient was a semi-retired professional opera singer. He enjoyed playing golf as often as possible and was also a semi-retired mountain climber. The patient ate a balanced diet, but drank coffee and tea averaging four cups daily. He did not take any supplements and was a non-smoker.

He had received treatment and orthotics for his plantar fasciitis that, so far, were not successful. The patient also had pains and muscular twitching in his legs primarily at night (RLS), but also in his right calf muscles when walking. Dananberg has shown that symptoms associated with foot dysfunction include tibialis posterior dysfunction, anterior knee pain and low back pain.<sup>21</sup> The patient's medical doctor had diagnosed foot drop on his right side three months before the chiropractic examination, and a surgical consultation was advised. Anxiety about the surgical approach brought him to a chiropractor for evaluation. The patient complained that pain in both feet was constant, but worsened with walking.

At the author's request, the patient completed a pain drawing and a 1-10 visual analogue scale (VAS) of low back pain at his initial consultation. On the VAS, he rated his back pain as 6/10 at the time of his first appointment.

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When asked how many days a week he had the back, hip, leg and foot pain, the patient replied, "seven days out of the week."

Thorough orthopedic and neurologic tests were conducted, as well as an examination for signs for the low back, pelvis, and sciatic nerve. These tests and signs were positive in the identical locations

where pain was reported and muscle impairments were later found. (Table 1) The positive orthopedic tests included Trendelenburg's, Kemp's, FABERE Patrick's, Hibb's, with pain on palpation of the right dorsal sacro-iliac and sacrotuberous ligaments, lower lumbar facets, sacro-sciatic notch, and plantar fascia.

Functional hallux limitus (FHL) was present in both feet (most markedly on the right).

Radiographic examination of the foot showed no obvious evidence of a heel spur, but a negative X-ray for bone spur was judged inconclusive, as in the early stages visual evidence is often minimal.<sup>22</sup>

## AK Examination

The purpose of specific muscle tests in the examination was to determine if there were objective musculoskeletal impairments that could substantiate the patient's continuing subjective complaints. Positive findings on MMT were used to guide the appropriate interventions that would take the patient from muscle weakness toward strength. If positive MMTs were found, then the examination design continued to determine in the cause of the dysfunction and whether it could be improved. To accomplish this, various sensory receptor stimuli (challenge and therapy localization [TL], see Appendix) were applied to determine if the muscle dysfunction was alleviated, indicating that the weakness was functional in nature and had potential for improvement.

The muscle tests listed in this examination as inhibited (Table 1) were equivalent to four or less on the five-point strength scale provided in the *Guides to the Evaluation of Permanent Impairment*, 5th Edition, by the American Medical Association.<sup>13</sup> (see

Appendix) Muscles graded four or less were considered weakened, warranting interventions as described below.

Additional findings related to the MMT were that the sternocleidomastoid bilaterally and the upper trapezius muscle on the right strengthened with forced expiration held. This test has been described in the literature.<sup>23-24</sup>

Palpable tenderness in the gluteus minimus muscle produced radiating pain into the lateral thigh and calf. (Figure 1) The suspicion of active myofascial trigger points (MTrPs) in the gluteus minimus muscle was investigated using the AK methods of pincer palpation and the muscle stretch reaction.<sup>25-27</sup> Both of these tests identified the presence of active MTrPs in this patient's case. Helbing's sign (indicative of foot pronation) was present in both feet, as was the AK shock absorber test (SAT). (Figure 2) The SAT involves striking the foot in various directions and then assessing changes in muscle strength. The SAT has recently been found to be a reliable tool for the discovery of subluxations of the foot that create muscle weaknesses in the proximal leg muscles.<sup>28</sup>

**Figure 1: Referred pain from pressure on the gluteus minimus muscle myofascial trigger point.**<sup>26</sup>



**Table 1: AK Assessment and Treatment Sequence**

AK Examination Finding	Corrective Treatment/ Outcome
Bilaterally inhibited psoas and gluteus maximus muscles	Occipital fixation SMT (strengthened psoas and gluteus maximus muscles bilaterally) <sup>25</sup>
Occipital fixation SMT (strengthened psoas and gluteus maximus muscles bilaterally) <sup>25</sup>	Right inspiration, left expiration assist cranial fault corrections to the temporal bones bilaterally strengthened SCM muscles bilaterally and right upper trapezius
Occipital fixation SMT (strengthened psoas and gluteus maximus muscles bilaterally) <sup>25</sup>	Percussion of the trigger point in the right gluteus minimus muscle corrected stretch-induced inhibition and strengthened the right tensor fascia lata muscle <sup>25, 30</sup>
Occipital fixation SMT (strengthened psoas and gluteus maximus muscles bilaterally) <sup>25</sup>	Insalivation of Cataplex G (vitamins riboflavin, niacin, and B6) corrected inhibition of rectus femoris with lumbar flexion.
Gluteus maximus muscles inhibited bilaterally	SMT for an upper cervical fixation (strengthened the gluteus maximus bilaterally) <sup>25</sup>
Positive challenges for a category II and category III pelvis with a right posterior ilium	SMT pelvis (DeJarnette wedges, including prone using high-velocity, low-amplitude manipulations with a drop-table) abolished challenge to the pelvis and lumbar spine and strengthened the adductor and hamstring muscles bilaterally <sup>25</sup>
Positive challenge to the foot (shock absorber test) weakened previously strong indicator muscles. <sup>12, 25, 28</sup> Flexor and extensor hallucis and posterior tibialis muscles inhibited on the right foot	Manipulation to articulations of the right foot (guided by AK challenge methods) abolished the shock absorber test and strengthened the extensor and flexor hallucis and posterior tibialis muscles on the right foot. This also corrected FHL bilaterally.

## Intervention and Outcome

In AK, once the dysfunctional muscle has been identified, several treatment options are open to the doctor. The one that is most effective in

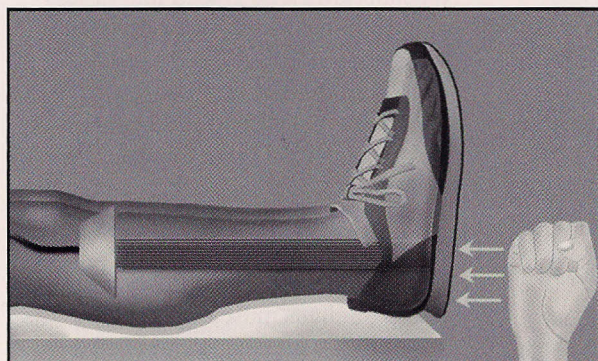
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# Peer Reviewed Case Study

continued from page 7

**Figure 2: AK Shock Absorber Test 28**



restoring strength to the inhibited muscle (using the challenge and TL procedures) is used by the doctor to guide the treatment given to the patient.<sup>25</sup> (see Appendix) Challenge is a diagnostic procedure unique to AK used to determine the body's ability to cope with external stimuli, which may be physical, chemical or mental. TL is another diagnostic procedure unique to AK that consists of placing the patient's hand over areas of suspected involvement and observing a change in the MMT.

Treatment began with an attempt to correct the causes of the muscular and deficits found throughout the body on examination. (See Table 1)

Upper cervical corrections (guided by AK challenge methods) were performed and returned strength to the inhibited psoas and gluteal muscles. (Figure 3a and 3b, Table 1, Appendix)

Insalivation of a nutrient produced by Standard Process Labs (Palmyra, WI) called "Cataplex G" (a combination of the vitamins riboflavin, niacin, and B6) was followed by immediate reduction in the palpatory tenderness in the patient's calf muscles and strengthening of the weakening effect of flexion of the lumbar spine upon the rectus femoris MMT.

Treatment of the foot was likewise accomplished with HVLA manipulations and abolished the muscle weaknesses in the legs resulting from the SAT and all subsequent directions of challenge to the foot. This also corrected the functional hallux limitus (FHL) that was present in both feet. FHL involves limitation in dorsiflexion of the first metatarsal-phalangeal joint during walking, despite normal function of this joint when non-weight bearing.<sup>21, 25</sup>

Dananberg and others have shown FHL to be a remote, often hidden source of postural degeneration and pain.<sup>21</sup>

After these procedures, provocative challenges and orthopedic tests were repeated at the sacro-iliac, lumbar, and ankle-foot articulations and were negative.

After his first treatment session of one hour, the patient reported that his comfort in moving and sitting had improved. Over the next five days (three visits, 15-minutes each), the low back, leg and foot pain remained at the VAS level of one. After five visits (covering a three-week period), all of the patient's symptomatology was resolved with the score of zero on the low back VAS.

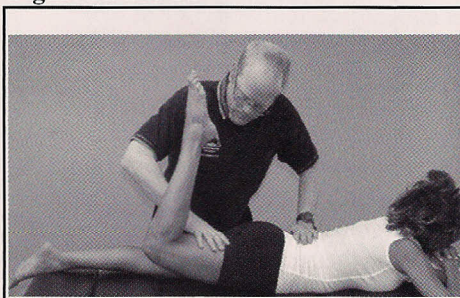
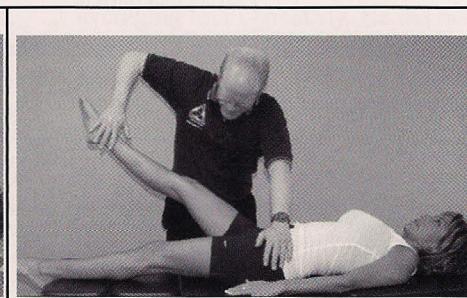
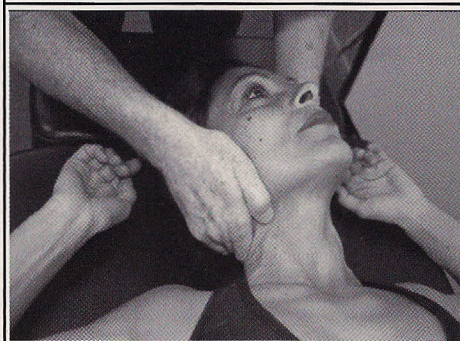
Follow-up seven years later showed no return of the patient's leg, foot and low back problems (he returned to his normal regimen of hiking and golfing) and free of restless leg syndrome, since his first

assessment procedure to a range of treatment options. The muscular inhibitions found with the MMT were given specific physical challenges that improved the patient's muscular strength; these challenges then guided the manipulative treatment applied and normalized tissue tensions on follow-up MMT.

Travell and Simons state that "weakness is generally characteristic of a muscle with active myofascial trigger points (MTrPs)."<sup>26-27</sup> Simons states that because the taut band in the muscle (the Locus In Quo of MTrPs) is likely to create enthesopathy, stretching the muscle (as is done in the AK "muscle stretch reaction" test) might inflame its attachments, and thereby produce the muscle weakness.<sup>27</sup>

Mense and Simons also suggest that the recognition of the muscle weakness caused by MTrPs is often a critical step in the restoration of normal function. Other muscles suffer from compensatory overload due to the inhibition created by the MTrPs in the inhibited muscles in their view.<sup>27</sup> This was the rationale in this case for seeking MTrPs in the gluteus minimus muscle and

**Figure 3a and 3b**

	
Gluteus Maximus muscle manual muscle test	Psoas muscle manual muscle test
	Upper cervical SMT correction strengthened the psoas and gluteus maximus muscles bilaterally

series of five initial AK treatments.

## Discussion

In AK, the assessment of specific localized muscular dysfunctions linked the

using the MMT to identify this phenomenon. The use of the MMT for the identification of MTrPs makes the detection of the effects of MTrPs upon muscle function more rapid.



Travell and Simons<sup>26</sup> describe gluteus minimus trigger points as being "intolerably persistent and excruciatingly severe" and to refer pain down the lateral and posterior thigh and lower leg as far as the ankle, into the lower lateral buttock and to rarely include the dorsum of the foot. They offer the term "pseudo-sciatica" in regards to gluteus minimus referral patterns "when sensory and motor neurological findings are normal."

Treatment for the MTrPs found in the patient's right gluteus minimus muscle was made with a Percussor instrument. After two minutes or percussion upon the MTrP, the AK "pincer palpation" and muscle stretch reaction tests became negative, and pressure on the MTrPs that previously produced referred pain down the lateral leg no longer occurred.<sup>29</sup>

It is thought that the immediate effect of percussion is to modify the physical nature of the myofascial matrix.<sup>30</sup> Percussion may also press fluid from the nuclear bag of the muscle spindle cells (part of the MTrPs pathophysiology), reducing the tension in the capsule of the spindles.<sup>27</sup>

In this case report, "insalivation" of the nutritional supplement for this patient refers to the fact that the taste buds on the tongue can detect extremely small concentrations of substances within a fraction of a second.<sup>32</sup> Oral nutrient evaluations are used clinically in AK in the assessment process. Exposure to taste elicits a variety of neurological, muscular, digestive, endocrine, cardiovascular, thermogenic and renal responses.<sup>33</sup> The relationships between muscle function and specific nutritional deficiencies have been described by Travell and Simons.<sup>27</sup>

The nerve pathways causing change in muscle function as observed by MMT are still unclear; however, there is considerable evidence in the literature of extensive efferent function throughout the body from stimulation of the gustatory and olfactory receptors with actual insalivation<sup>32</sup> rather than merely the contact of a substance with the hand or belly as often taught and erroneously labeled AK by some practitioners.<sup>34</sup>

In this case, muscular impairments associated with this patient's

pain appeared to be an accurate measurement of the distress the patient was under. Treatment for these factors was followed by elimination of the patient's pain and restoration of postural and muscular balance.

## Limitations

As in any case study, the natural resolution of symptoms in the patient cannot be ruled out. The possibility of this occurrence is diminished; however, by the rapid and sustained disappearance of symptoms within days of treatment, whereas the sciatic neuralgia had persisted for four months and the RLS and plantar fasciitis pains for 30 years prior to the interventions described in this report.

**AK is always used in conjunction with other methods of diagnosis including standard orthopedic, neurologic, laboratory and physical examinations.**

## Conclusion

After four months of low back and radicular pain and 30 years of foot pain and RLS, the patient recovered rapidly once treatment was initiated. The treatment was aimed at affecting aberrant muscular functioning. The tool used that helped match the treatment for this patient's complex lumbo-pelvic, pes planus and FHL foot dysfunction was MMT, which in AK is always used in conjunction with other methods of diagnosis including standard orthopedic, neurologic, laboratory and physical examinations as demonstrated in this case report. The patient has remained free of symptoms in these areas of difficulty for seven years since initial treatments.

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continued on page 19



continued from page 9

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## Appendix: Glossary of Applied Kinesiology Terms Used

### Manual Muscle Test

The actual testing of the muscle had been previously and firmly established by Kendall and Kendall, [11] who held that a muscle from a contracted position against increasing applied pressure could either maintain its position (rated as "facilitated" or "strong") or break away and thus be rated as "inhibited" or "weak". The testing of muscle strength itself has been widely practiced in manual medicine for decades by such authorities as Daniels, Worthingham, and the use of the MMT for functional conditions continues today with the work of Goodheart, Janda, Lewit, and Liebenson. [3-12] The American Medical Association has accepted that the standard method of MMT used in AK is a reliable tool and advocates its use for the evaluation of disability impairments.[13] According to this rating system, a grade 5 MMT is normal muscle strength, demonstrating a complete (100%) range of movement against gravity, with firm resistance offered by the practitioner. Grade 4 is 75% efficiency in achieving range of motion against gravity with slight resistance with decreasing increments of 25% efficiency with each lower grade to a minimum of 0. Muscles graded 4 or less were considered weakened, warranting interventions as described in the report.

### Challenge

Challenge is a diagnostic procedure unique to AK that is used to determine the body's ability to cope with external stimuli, which can be physical, chemical, or mental. Cranial and vertebral challenge has been described in the literature previously. [3, 12, 23-25] After an external stimulus is applied, muscle-testing procedures are done to determine a change in the muscle strength as a result of the stimulus. Through this approach, ineffective therapies that produced no improvements in muscle strength were rejected, and only those that elicited a positive muscle response were used. This guided the treatments given to the patient.

### Therapy Localization

Therapy localization is a diagnostic procedure unique to AK that consists of placing the patient's hand over areas of suspected involvement and observing for a change in the MMT. This method assists the doctor in rapidly finding areas that are involved with the muscle dysfunction found on MMT and has been used clinically for over 30 years.[12, 25] Pollard et al in a recent literature review outlined research supporting the AK concept of therapy localization.[31] Collectively these data suggest that stimulating or stabilizing the muscles, joints, ligaments, and skin -- and their associated cutaneomotor reflexes -- can produce changes in muscle function.

### "Weak" Muscle

A muscle that may or may not develop full power, but on MMT it does not neurologically function at its full capacity. Preferable terms for muscles that test weak or strong are termed conditionally inhibited and conditionally facilitated, respectively. **Indicator muscle** A muscle tested to determine if there is a change in its strength as a result of some testing mechanism (challenge or therapy localization, for instance) applied to the body. Generally an indicator muscle is strong prior to the test, and weakens as a result of the testing procedure.

### Myofascial Trigger Points (MTrPs)

According to Liebenson [7] the combination of muscular inhibition, joint dysfunction and trigger point activity is the key peripheral component leading to functional pathology of the motor system. In AK, the presence of myofascial trigger points can be objectively identified using the muscle stretch procedure that produces detectable changes in muscle strength on MMT.[12, 25-27, 29]