Chiropractic reply to Janda's propositions 4 and 5

Visual Assessment is the most reliable form of assessment for muscular imbalance.

Janda's 3 Lower Body Tests

The Prone Hip Extension (PHE) test

This test was developed by Janda as a means of assessing motor control of specific low back and thigh muscles. During the PHE test the physician palpates the ipsilateral gluteus maximus, ipsilateral hamstring, ipsilateral erector spinae, and contralateral erector spinae muscles in order to determine the order of activation. Janda theorized that the muscle activation sequence during the PHE simulates the muscle recruitment pattern of hip extension during gait. Janda did not develop a method for using the MMT to assess '*gait dynamics*'.

Janda proposes that the "normal" order of muscle activation is as follows:

- Gluteus maximus activates first,
- Hamstrings second,
- Contralateral erector spinae third,
- Ipsilateral erector spinae last.

'The most common sign of a faulty movement pattern is over-activation of the hamstrings and *erector spinae* and delayed or absent contraction of the *gluteus maximus*.' The PHE test demonstrates a relative imbalance between the hip extensors themselves (*gluteus maximus*, the hamstring and the *erector spinae* muscles) as well as between the hip extensors and the hip flexors (*iliopsoas, quadriceps*).

However, which muscle and motor neuron is at fault when the movement pattern above is impaired? (For Janda, visualization and palpation determines this.) What is the source of the disturbance to the muscle (joint subluxation, trigger point, ligament, muscle spindle cell, meridian imbalance, dehydration, emotional overlay, etc.?) In the rehabilitation model developed by Janda, treatment to a palpable source of tension is given and then visual reassessment performed. (Is it any wonder that several weeks of treatment, including exercises, are necessary before a clear and definitive outcome for the patient can be seen or measured?)

Unfortunately Janda's order of muscle activation has also been shown to be inaccurate.

Figure 8 a, b: Prone Hip Extension (PHE) Test

Normal

Abnormal, showing lumbar extension, anterior pelvic tilt, and knee flexion.

Figure 9: Performing the PHE test. Doctor position is square to the patient at the level of the pelvis

Jarosz (2010) reviewed 11 studies which evaluated the muscle sequence activation order of the PHE test and found that the proposed '*normal*' order of muscle activation (i.e. *gluteus maximus*, hamstrings, contralateral and finally ipsilateral *erector spinae*) during the PHE test is incorrect. Two studies (n=51 and n=30 respectively) showed that Janda's proposed muscle activation pattern was used in less than 0.5% of PHE test repetitions. (Bruno & Bagust 2007, 2006) Furthermore the timing differences between the onsets of muscle activation are quite small and are described in some studies as '*almost simultaneous*'. (Sakamoto et al. 2009; Nygren Pierce & Lee 1990)

In clinical practice it would be improbable to accurately determine the muscle activation order via palpation and/or visualization alone. Only with the use of EMG could these minor disparities be detected. Jarosz (2010) notes that '*the solitary consistent finding within the literature was that the gluteus maximus activated last during PHE*', a precise reversal of Janda's thesis.

Additionally, Hestboek & LeBoeufe-Yde (2000) performed a systematic review of peer-reviewed chiropractic and manual medicine literature relating to the accuracy of tests performed for the lumbopelvic spine. In their conclusion they state: '*Only studies focusing on palpation for pain had consistently acceptable reliability values. Studies testing for motion palpation for the lumbar spine and sacroiliac joints, for leg-length inequality, and most of the sacro-occipital technique tests had mixed findings, whereas visual inspection…had consistently unacceptable agreement.*'

The AK method of therapy localization and challenge offers a way of making the PHE test clearer and more useful.

As Janda proposed in his college thesis, (1964) in sacroiliac strains the ipsilateral *gluteus maximus* will test weak. With TL to the S-I joint, the *gluteus maximus* strengthens, or in this scenario, the PHE test is improved.

Figure 10: Prone Hip Extension (PHE) Test with therapy localisation

Hip Abduction Movement Pattern Test

Figure 11 a, b: Sidelying Hip Abduction Test

Normal: The patient is instructed to lift the leg toward the ceiling. The normal pattern of hip abduction is abduction to about 20 degrees without any hip flexion or internal or external rotation and with a stable trunk and pelvis – in other words, abduction without any hip elevation or trunk rotation.

Abnormal: In an abnormal hip abduction test, hip abduction is initiated by contraction of the *quadratus lumborum* before 20° of hip abduction, resulting in a lateral pelvic tilt or hip hike. In this case, the *quadratus lumborum* muscle changes from a pelvic stabilizer to a prime mover.

Liebenson (2019, 2007) reports that altered hip abduction commonly involves an inhibited gluteus medius, together with overactive and probably shortened:

- Antagonists: adductors
- Stabilizers: quadratus lumborum
- Synergists: tensor fascia lata
- Neutralizers: piriformis

However, which muscle is at fault? (In the Janda-Rehabilitation approach, palpation and visualization determines this.) And if inhibition of the gluteus medius underlies the abnormal hip abduction test as Liebenson suggests, why isn't the MMT used for discovery of this dysfunction? What is the source of the disturbance to the muscle (joint, trigger point, ligament, spindle cell dysfunction, dehydration, emotional overlay?) Further, are these etiological factors connected, in the clinician or the patient's mind, to the positive test indicating the disorder causing the patient their pain?

The AK method of therapy localization and challenge offers greater clarity to the Janda tests.

Figure 12: In the Hip Abduction Test, therapy localization (TL) to the origin of the gluteus medius muscle may immediately correct the abnormal test if this muscle is at fault. (Hip hike eliminated and the test performed smoothly and comfortably by the patient)

To sum up, in the AK assessment of the sacroiliac joint, the specific functional strengths of the *gluteus maximus, gluteus medius, piriformis, quadriceps,* abdominals, hamstrings (*biceps femoris, vastus lateralis* and *medius*) and *latissimus dorsi* – critical to the adequate form closure of the sacroiliac joint (Knutson, 2004) – are tested.

Additionally, the effect of stabilization (the AK sensorimotor challenge) of proximal or distal structures like the sacroiliac joints, lumbar vertebral joints, cervical spine (with TL and challenge) upon each of these muscle's functions is an important addition to the AK system of analysis. The MMT of each of the muscles involved (and their association to one or more structures located locally or distally) is believed to untangle these complex adaptations to sacroiliac joint dysfunctions. In addition, the AK methods of TL and challenge offer further insight into the PHE test.

Trunk Curl-Up Movement Pattern Test

Figure 13a: Trunk curl-up test

The trunk curl-up test estimates the interplay between the *iliopsoas* and the abdominal muscles. With the patient supine the examiner analyzes the patient's preferred way of doing a sit-up. If the sit-up is performed with adequate abdominal contraction, a flexion or kyphosis of the upper trunk is seen. However if the movement is performed primarily with the hip flexors, curling of the upper trunk is minimal and an anterior tilt of the pelvis is observed, VISUALLY. Always use VISUAL or observational diagnosis for assessment of normal or abnormal muscle function, muscle function that takes place hidden beneath the '*skinvelope*'.

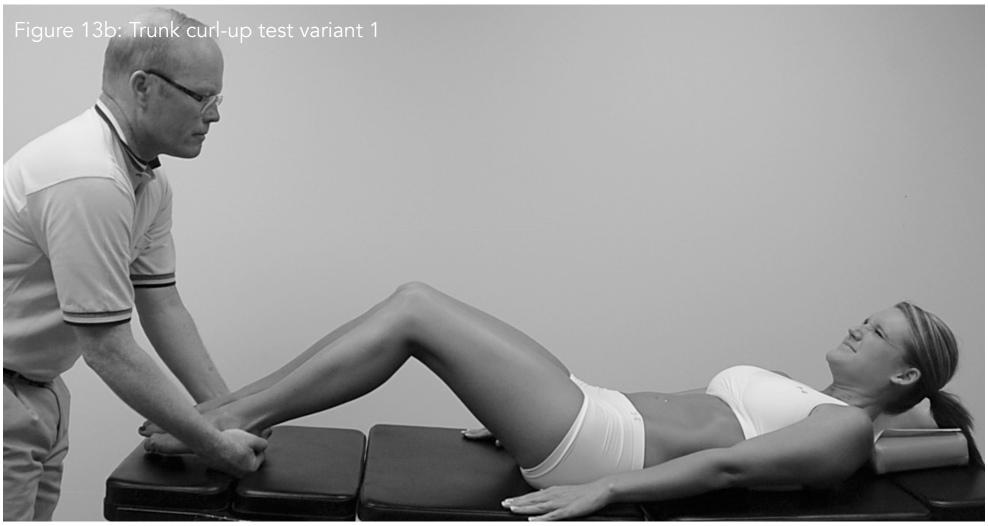
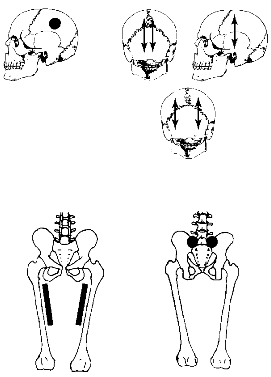


Figure 13b: Trunk curl-up test variant 1

The curl-up test can also be performed (Variant 1) with the examiner placing his hands under the patient's heels to detect early loss of pressure. If a loss of heel pressure is detected before the end of the sit-up, the test is positive, indicating the dominance of the hip flexors over the abdominal muscles.

Figure 13 c, d, e: AK comprehensive analysis of *abdominal* and *quadratus lumborum* muscle dysfunctions - these variants do not evaluate the functioning divisions of the *abdominal* or *iliopsoas* muscles or the etiology of dysfunctions found during the test nor the very large assortment of factors that may impair these muscles' function.

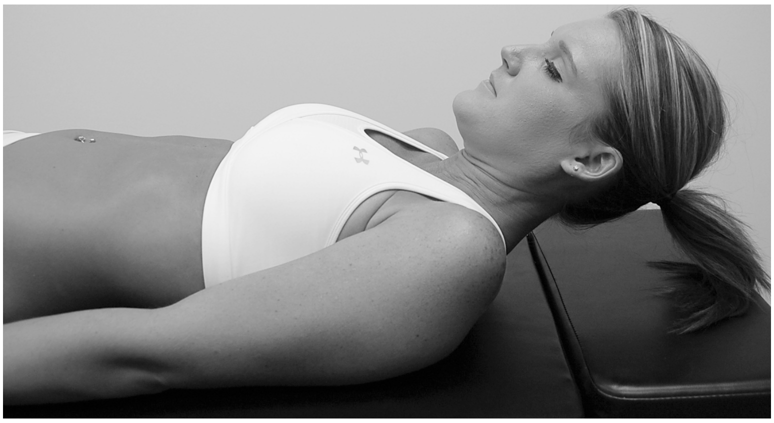


Janda's 3 Upper Body Tests

1) Cervical Flexion Movement Pattern Test

A proper movement pattern for deep neck flexor muscle function entails cervicocranial flexion throughout the test. The cervical flexion test purportedly estimates the interplay between the deep cervical flexors and its synergists, namely the SCM and anterior scalenes.

Figure 14: Cervical flexion movement test



Normal

Abnormal

The test is positive (Fig. 14 'abnormal') when the chin or jaw juts forward at the initiation of movement, '*suggesting a dominance of the SCM and scalenes over the weaker deep cervical flexors.*'

Because the cervical muscles are so complex in their functioning, Janda admits '*If the pattern is unclear, the clinician places 1 or 2 fingers against the patient's forehead to apply a slight resistance to movement.*'

Essentially '*if you can't see it, manual muscle test it*'

Once again the AK method of therapy localization and challenge makes the Janda test of abnormal movement function far clearer.

Figure 15: Cervical flexion movement pattern therapy localization

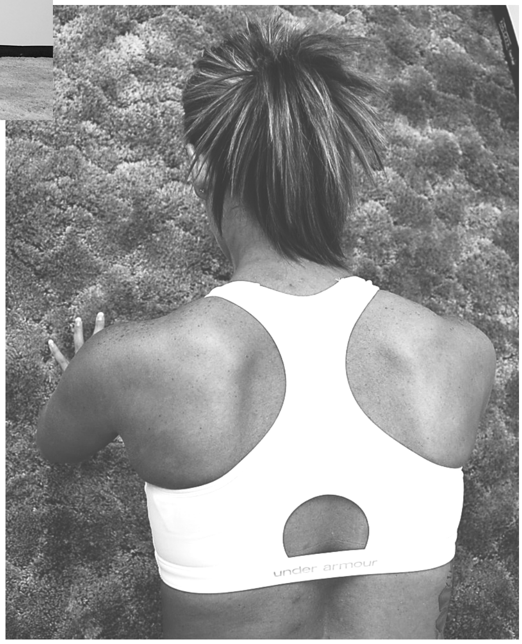
The Cervical Flexion Movement Pattern Test may be improved with TL to upper cervical spine. TL to the upper cervical area may immediately correct the abnormal test if this area is at fault. (Chin or jaw jutting forward will be eliminated and the test performed smoothly and comfortably by the patient)

Figure 16: Cervical flexion movement pattern therapy localization for the deep neck flexors

2) Push-Up Movement Pattern Test

This test purportedly assesses the ‘*quality of dynamic scapular stabilization*’. The key finding from this test is ‘*weakness of the serratus anterior becomes evident when the patient displays winging of the scapula or excessive scapular adduction or is unable to complete the range of scapular motion in the direction of abduction. Dominance of the upper trapezius and levator scapulae is demonstrated by excessive shoulder elevation or shrug*.’

Figure 17: ‘Push-up’ movement pattern test



Scapular winging, the so-called Gothic shoulders, the levator notch, and excessive bulk of the pectoral muscles are the body-language signs indicating that the clinician should include the Push-Up Test to confirm the imbalances associated with the *Upper Crossed Syndrome* described by Janda.

Figure 18: Gothic shoulders

The specific functional strength of the *infraspinatus, subscapularis, middle, anterior* and *posterior deltoid, pectoralis major* and *minor* (*sternal* and *clavicular* divisions), *latissimus dorsi, upper, middle*, and *lower trapezius, levator scapulae, rhomboid muscles* and more are neglected in this examination system.

Additionally, the effect of stabilization of proximal or distal structures like the *acromio-clavicular joint* or cervical spine (with therapy localization and challenge) upon these muscles' function is an utter unknown in this system of analysis. These tools along with the functional evaluation of muscles provide valuable additional tools for the clinician in the evaluation of the total shoulder joint complex.

As noted throughout the MMT literature, a muscle must function from a stable base to test strong. Stability of the clavicle and/or scapula is essential for normal shoulder muscle function. If during the examination of the shoulder there is weakness during shoulder MMT, re-evaluate the test by stabilizing the clavicle or scapula. When lack of clavicular or scapular stability is causing a shoulder muscle to test weak, determining the reason for the instability goes a long way toward correcting shoulder dysfunction and the muscular imbalances that create it.

3) Shoulder Abduction Movement Pattern Test

The shoulder abduction movement pattern test is normal when the shoulder itself begins to rise only after 60 degrees of shoulder abduction while there is an associated scapular elevation.

Figure 19a: Normal shoulder abduction movement pattern test

Shoulder abduction movement test is abnormal (the scapulo-humeral ratio is disturbed) when there is any noticeable elevation of the shoulder girdle before 60 degrees, and indicative of incoordination and impairment of the force couples among the muscles involved in shoulder abduction. Note in the shoulder abduction test above the right cervical rotation, which indicates dominance of the levator scapulae.

Figure 19b, c: shoulder abduction movement pattern test with indicators of abnormality

Once again the AK method of therapy localization and challenge makes the Janda test of abnormal movement function in the shoulder clearer.

Figure 20: Shoulder Abduction Movement Pattern Test immediately improved with TL to the acromio-clavicular joint (subsequent challenge showed that this joint dysfunction was inhibiting the subscapularis, *middle deltoid*, and *serratus anterior* muscles).

In the Shoulder Abduction Test, TL to the acromio-clavicular area may immediately correct the abnormal test if this area is at fault. (Shoulder girdle movement no longer occurs before 60° of abduction and the test is now performed smoothly and comfortably by the patient)

It should be obvious that the MMT of each of these specific muscles of the shoulder would help to untangle the complex adaptations occurring in a patient with shoulder problems. Visual assessments would be enlightened by this method of muscle function evaluation.

Janda's Crossed Syndromes

Six functional tests suggested by Janda are said by many to offer a rapid screening of major movement patterns of key muscles in the hip, shoulders and neck. (Liebenson 2019, 2007; Chaitow & DeLany 2008; Morris 2006)

Janda's conception that postural muscles tend to be tight and phasic muscles tend to be weak is far too restrictive as will be seen by the many studies that show postural muscles so frequently inhibited in physical disturbances, especially low back and neck pain. (Jull et al. 2019; Cuthbert et al. 2018; Cuthbert 2009 a, b, c, d; Jull et al. 2008) Muscle fiber types (tonic and phasic, slow twitch and fast twitch) are not fixed and evidence shows the potential for adaptability of muscles based on use and need, so that muscle fibers can be transformed from slow twitch to fast twitch and vice versa. (Lin 1994)

An international panel of experts discussed the role of muscle imbalance and classification of muscle function in the *Journal of Bodywork and Movement Therapies*. (Bullock-Saxton et al 2000) Interestingly, even among these experts, there was still confusion regarding muscle classification particularly as delineated by Janda. It may be that this confusion, which presumably would be greater in '*non-experts*', could be part of the reason that '*muscle imbalance*' has not become a mainstay of clinical assessment for many manual therapists.

The traditional Janda approach to muscle imbalance may have lost some of its appeal, because to measure such length-tension relationships and joint changes about both the pelvic and pectoral girdles (without the MMT) and to assess their impact on spinal mechanics through inclinometry takes longer than the average consultation usually allows. So in traditional physiotherapeutic clinical practice, PTs are left with visually assessing muscular imbalance and then offering physical treatments and exercise recommendations based on the surmises of the visual and palpatory evidence, all of which has some serious short comings.

1. This approach depends on subjective assessment – which is open to bias (visual and palpatory unreliability).
2. This subjective assessment approach provides little incentive for the patient to perform prescribed corrective exercises – especially in the absence of pain.

Hence it is strongly urged (Chaitow, 2008) that to evaluate muscle imbalance using the Janda approach, clinical measurement tools including inclinometers, tape-measures, rib- calipers, forward-head calipers, plumb-line and digital-camera and/or camcorders must be used. This is rarely the clinical setting the vast numbers of clinicians treating musculoskeletal pains around the world can offer to the hundreds of thousands of patients who seek care for these conditions.

Static postural pictures are only '*snapshots*' of postural, anti-gravity muscles even when assessed carefully with a plumb-line. These syndromes of postural imbalance give the clinician an image but do not explain why the image exists or how well the individual is adapting to the changes involved. When faced with structures which are apparently '*weak*' or '*tight*', it is of clinical importance to consider '*why is this happening*?' and '*where are these disturbances coming from*?'

A full functional AK structural examination may include (depending on the condition) a wide range of MMTs, motion assessments and sensorimotor challenges to the joints that are related to the positive MMT; palpation to assess for freedom/restriction (ease/bind); the effect of mental-emotional thoughts or images upon the MMTs; the effect of related nutritional factors, meridian tonification or sedation point stimulation upon the MMT and more. Each of these influences produces measurable effects upon the reliable MMT that can be objectively measured immediately. The increased speed of detecting the broad array of interactions going on within the body (and the influence of biomechanical, biochemical, and psychological disturbances upon local or global muscle function) makes the AK use of the MMT a genuine asset in the clinical examination of muscle imbalance phenomena.

These remarks are designed to help make sense of the postural, orthopedic, and palpation tests Janda has offered and to offer confirmation of best treatment choices. Once a dysfunction has been identified by virtue of a visual or palpatory test, it is necessary to define precisely what type of dysfunction exists. The effect of this dysfunction upon attaching or remote muscle function is suggested by the therapy localization and challenge procedures in AK. The associated muscle weakness, easily determined by MMT, is then evaluated with a challenge procedure. Appropriate angular and pressure stimulation of the articulation produces immediate strengthening of inhibited muscles related to the dysfunction.

Goodheart's Modular Syndromes:

more individual and more reflective of the human variability of adaptation to dysfunction

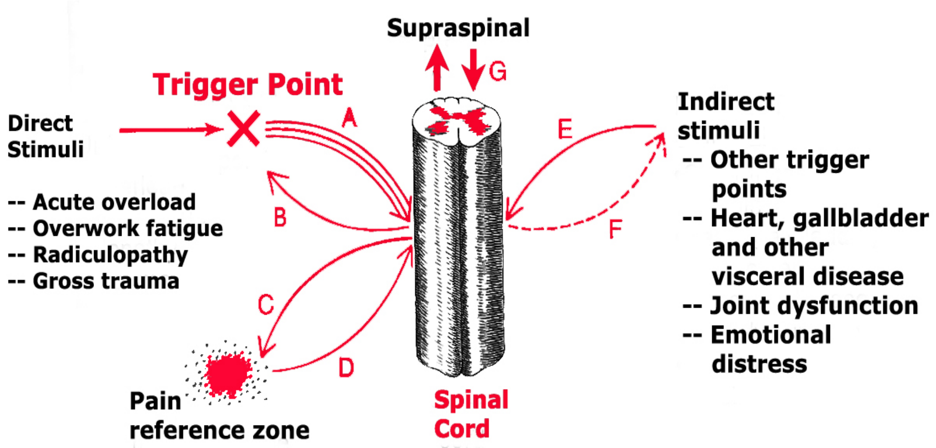
In AK testing, there can be lower and upper body disturbances, rotatory disturbances, and a multiplicity of postural syndromes resulting from injury to one or more of the 5-factors of the IVF. The disorders that Goodheart describes are not '*absolute muscular realities*'. (Goodheart 1980) (Goodheart's PRYT modular system of diagnosis, for instance, anticipated Janda's description of the various Crossed Syndrome patterns by several years.)

On the other hand, a risk with Janda's model of muscle dysfunction (based on visualization and palpation) is that practitioners may expect to find set changes to occur and fail to adequately assess the patient's genuine state of adaptation and dysfunction. Naming the postural category and then treating the category is equivalent to giving all patients a general adjustment, or the same all-purpose multi-vitamin pill. This will usually result in poor treatment outcomes. Every muscle that is part of an articular and postural dysfunction or part of a kinematic chain of muscular dysfunction (Myers 2010) must be specifically assessed for strength, coordination, ease of use, length and tone no matter whether you follow the Goodheart or the Janda model clinically.

Although these distinctions between postural and phasic muscles (including upper and lower crossed syndromes) can usefully assist the clinician, they are not cast in stone. Diagnosis of muscular imbalances underlying articular dysfunctions must be refined to reveal the subtleties of the muscle system's reactions to injury, pain, altered use and pathology in the particular patient under study.

Goodheart points out that muscular adaptation can involve a wide variety of influences (structural, chemical, and mental). (Goodheart 1964-1998) The clinician therefore must keep in mind that what is presented in a patient with muscle imbalances may represent only the acute problems that brought the patient in for care that have evolved out of a multiplicity of chronic adaptive patterns. Discovering the core of the problem and diagnosing the treatable obstacles to normal function involves patience, adaptability and skill ... and if you are using hands-on manipulative treatment methods, the correct model of muscle imbalance expedites and improves the care given.

Figure 21: Simons & Travell (1999) demonstrate the multiplicity of influences that may produce myofascial trigger point activity, pain and inhibition. (Reproduced with kind permission, Simons & Travell, 1999



Experienced clinicians will agree that unpredictability and individuality are the rule where muscular compensations are concerned, especially when recent adaptations are added onto chronic adaptation patterns in the typical patient. In the case of the muscle imbalance phenomenon, this should lead clinicians to evaluate individual muscles in individual humans with the MMT. In agreement with literature cited in this presentation, muscle inhibitions will be found to be major generators of the disorders clinicians treating neuromusculoskeletal disorders face in their patients.

Applied kinesiology solves many of Dr. Janda's and rehabilitative medicine's diagnostic dilemmas and challenges

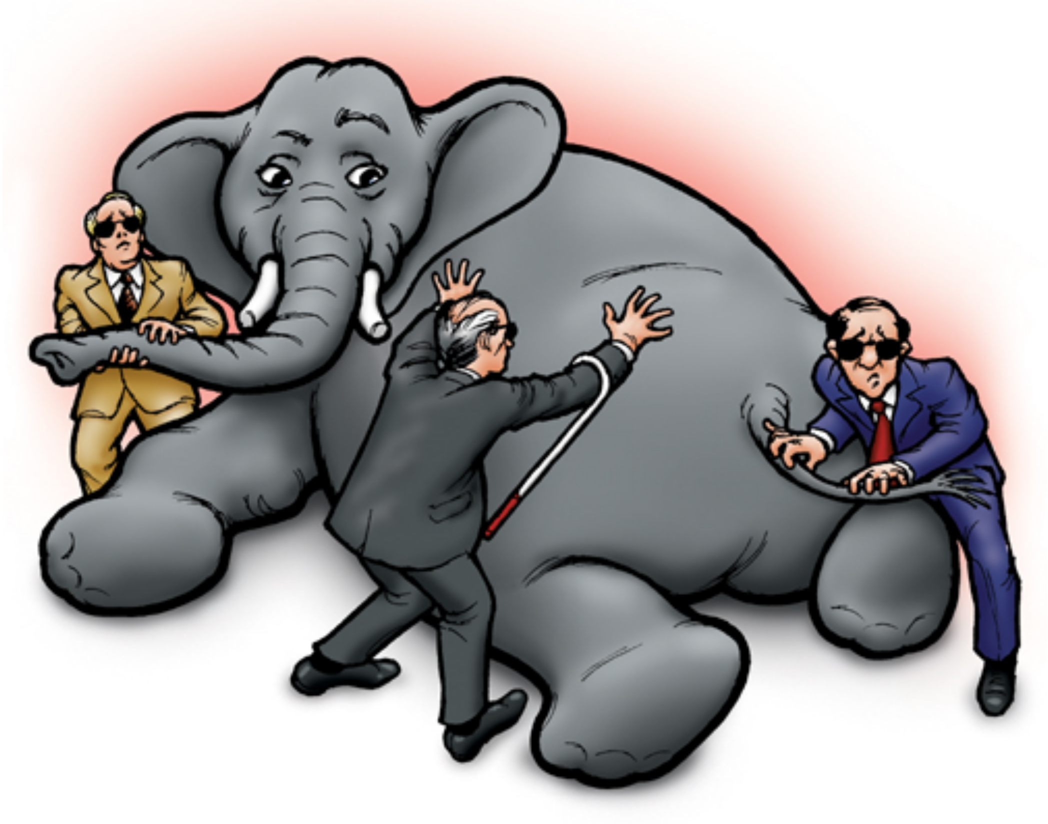
Finally, another reason for the decline in interest in the Janda approach to muscle imbalance in the physiotherapy and manual medicine communities is that, as with nearly all clinical entities, to find a '*text book*' case is less common than finding a partial case. This brings with it confusion.

Commonly the approach to diagnosing a muscle imbalance (for practical purposes) is based primarily on subjective assessment, such as the visual observation of standing posture or the palpation of muscle sequences during basic movement pattern diagnosis as described above. While this approach may be time effective and is not useless, it does mean that prescription of treatment – in the physiotherapy world, corrective stretching, corrective mobilization, corrective exercises and life-style advice – may be non-specific. Additionally, aside from symptomatology, progress is difficult to gauge with such subjective tools of evaluation. Lederman, in a comprehensive of the '*Core Stability Movement*' found that core stability exercises were no more effective than, and will not prevent injury more than, any other forms of exercise or physical therapy. (Lederman 2010)

Interestingly, Goodheart's diagnostic concept of sensorimotor challenge and/or therapy localization has been restated by Vleeming and Lee (Vleeming et al. 2007; Lee 2004) in their '*form*' and '*force*' closure model of sacroiliac joint function.

Their development of this diagnostic method was in part due to the difficulty of the visual and palpatory method of diagnosis of muscular imbalance Janda had offered the physiotherapy and manual medicine communities worldwide.

Figure 22: The complexity of different perspectives in musculoskeletal diagnosis



Vleeming and Lee (2007) have developed functional tests that help the clinician determine the best positions of form and force closure in a particular joint by using visual tests that identify improved ranges of motion while improved form and force closure are applied across the joint.

Figure 23a: From Vleeming and Lee (2007) Form and Force closure

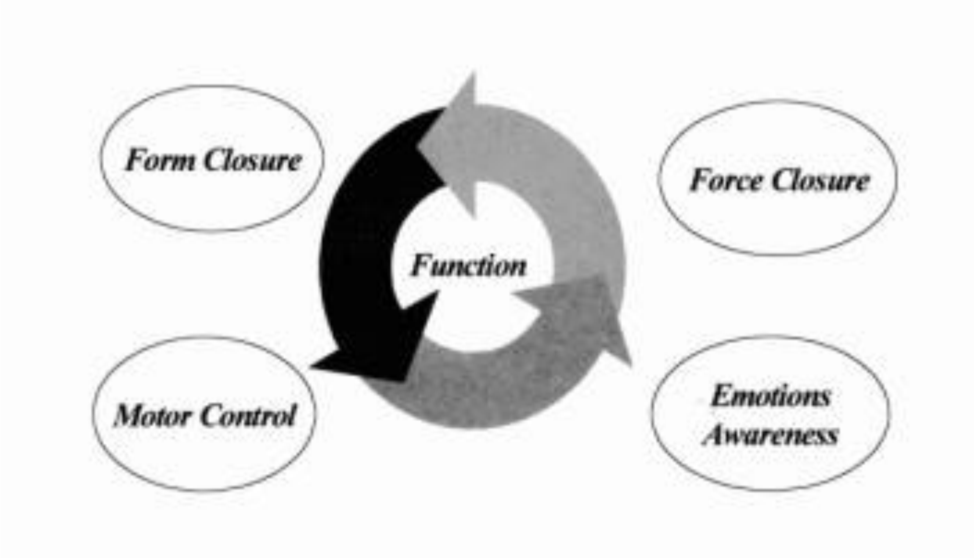


Figure 23b: Testing Form closure

With '*form closure*' (left) of the sacroiliac joint augmented (the sacroiliac joint approximated), the prone straight leg raise is visually improved.

With 'force closure' (below) across the sacroiliac joint augmented (the *latissimus dorsi* is recruited to increase tension in the thoracolumbar fascia), the prone straight leg raise is improved.

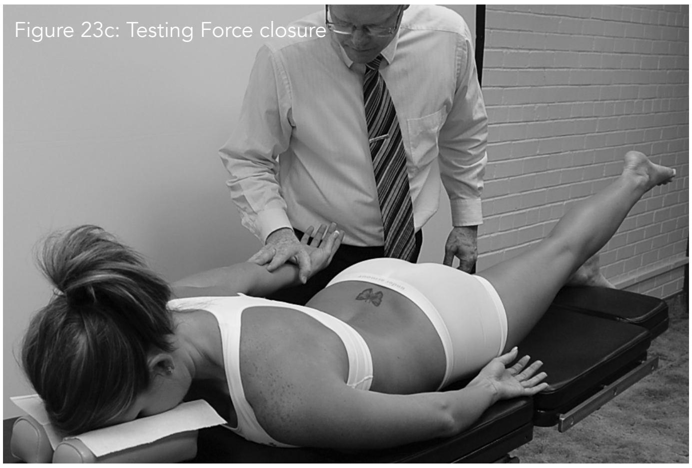


Figure 23c: Testing Force closure

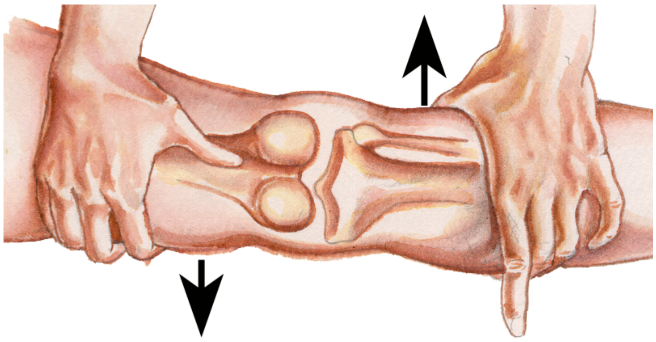
Instead of only approximating the joint as in the Vleeming and Lee diagnostic model (and then using a less reliable visual test for a change in movement), the AK sensorimotor challenge can determine the best angle of correction for the disturbed osteokinematics of the sacroiliac joint subluxation present (while using a more reliable test for a change in strength).

Figure 24: Category 1 sacroiliac joint challenge for dysfunction

In most joint dysfunctions, there will be a combination of vectors that causes the maximum amount of indicator muscle strengthening. This is the optimal vector for correction as well, the diagnostic test leading to the treatment necessary for correction.

Figure 26: Hamstring MMT following Category 1 sacroiliac joint challenge

Figure 25: Knee joint challenge for dysfunction



The enigma

As Liebenson (2019) wisely states, to effectively manage pain patients, it is critical to provide a focus on returning function as opposed to getting rid of dysfunction. Therefore the means to objectively assess joint position, joint range of motion and length-tension relationships is critical, in order to manage patients effectively and provide ongoing motivation for a return toward function.

Therapy localization and challenge methods from AK immediately change altered movement dynamics, muscle firing sequences, range of motion, velocity, responsiveness of contraction, and strength. This makes these two methods from AK extremely valuable to the clinician using the Janda diagnostic model to discover why muscle imbalances are occurring. Whenever muscle imbalances are found, a multiplicity of causes and maintaining factors may be associated with the hypotonicity or hypertonicity associated with a dysfunctional pattern.

One reason the cause of a patient's musculoskeletal pain is so enigmatic is that an adequate examination to cover the most common causes requires skills characteristic of as many as 10 disciplines. The clinician may be required to examine for muscle imbalance in the kinesiological sense, neurologic function, myofascial trigger points, fibromyalgia, psychological overlay, endocrine and nutritional imbalance, articular dysfunction and more. (Simons & Travell 1999)

Such a complete examination is indicated for the patient with chronic musculoskeletal pain who has seen many specialists without finding a satisfactory answer to the cause of his or her pain. This kind of examination for functional muscle imbalance is part of the applied kinesiologist's post-graduate training.

Conclusion

An effective examination requires the development of adequate palpation skills and excellent knowledge of every muscle's origin and insertion and myofascial attachments, anatomy and physiology. The details of this examination also vary from muscle to muscle and are not yet routinely taught in many chiropractic and medical training programs. With the development and expansion of applied kinesiology, more and more chiropractors, physical therapists, physiatrists, osteopathic physicians, dentists and medical practitioners of other clinical specialties have subsequently (or soon will) learn these important skills.

Goodheart, Janda, Liebenson, Morris, Chaitow, Vleeming and Lee each agree that muscles are in fact '*the most exposed part of the nervous system*.' Muscle testing for muscle imbalance therefore brings us back to the nervous system at the core of all human activity, this is where D.D. Palmer and George J. Goodheart, Jr. and Vladimir Janda started from in the first place.

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About the author

Scott Cuthbert, DC practices in the Philippines and is Associate Editor with the *Journal*. He has served on the Board of Directors of the *International College of Applied Kinesiology USA*. He is the author of three textbooks on applied kinesiology (in addition to 15 papers cited by *Index Medicus*, and over 50 peer-reviewed research papers) on applied kinesiology approaches to functional health problems.

As this narrative literature review demonstrates, Dr Cuthbert practices chiropractic with Mastery of the AK approach.

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