# Muscle energy technique: An evidence-informed approach

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**Fryer G. Muscle energy technique: An evidence-informed approach. *Int J Osteopath Med.* 2011;14(1):3-9.**

## Summary

This article describes the principles of evidence-based medicine and how these principles may be implemented in osteopathic practice and applied to the use of muscle energy technique. Because the feasibility of strict adherence to 'evidence-based' principles is debated, an approach of 'evidence-*informed* practice' is recommended. The principles and diagnostic and treatment practices associated with muscle energy technique are re-examined in light of recent research. Implications for the application of muscle energy are outlined, and recommendations are made regarding clinical practice.

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## Introduction

Muscle energy technique was developed by osteopathic physician, Fred Mitchell, Sr. It was refined and systematised by Fred Mitchell, Jr, and has continued to evolve with contributions from many individuals. Muscle energy technique (MET) is used by practitioners from different professions and has been advocated for the treatment of shortened muscles, weakened muscles, restricted joints, and lymphatic drainage. In addition to using muscle effort to mobilise joints and tissues, MET is considered by some to be a biomechanics-based analytic diagnostic system that uses precise physical diagnosis evaluation procedures to identify and qualify articular range of motion restriction.[1] Recent research suggests a revision of MET concepts and practices is required, particularly considering the trend towards evidence-based medicine (EBM).

## 1. Evidence-based Medicine and Evidence-informed Practice

Medical and allied health practitioners have been encouraged to practice according to the principles of EBM.[2] However, some practitioners raise concern that EBM may be applied for economic reasons rather than best care.[3, 4] Others argue that EBM does not account for other kinds of medical knowledge[5] and that EBM studies, primarily randomised controlled trials (RCTs), address average results from large groups instead of data applicable to individual patients.[6] A treatment effective for the majority may not always be effective for an individual for a variety of reasons, including the aetiology of their condition, past experience (negative or positive), and expectations of treatment outcome. Some approaches may be more effective in the hands of particular practitioners because of skill and experience.  Certain treatments may also have larger non-specific (placebo) effects, and these effects should not be dismissed.  The adoption of 'best' evidence may unintentionally limit practice, so balance between external clinical evidence and clinical experience is necessary.

In manual therapy, strict adherence to EBM is not possible due to a lack of high-quality evidence on which to base decisions.  EBM was originally intended to *integrate* clinical expertise with the best available clinical evidence,[7] but many have argued that a narrow interpretation of EBM is prevalent, where treatment must be *based* on high quality evidence and the role of clinical experience is devalued. [3-6] Given that many professions are not able to *base* treatment on evidence, it has been argued that a preferred terminology is 'evidence-*informed* practice'[8] or 'evidence-informed osteopathy',[9, 10] which more accurately reflects the realty of the use of evidence in osteopathic practice.  Evidence-informed practice has been defined as the process of  integrating research evidence when available but including personal recommendations based on clinical experience, while retaining transparency about the process used to reach clinical decisions.[7, 8]

### 2.1. *Implementing evidence-informed principles into osteopathic practice*

Given the paucity of high-quality research evidence related to osteopathic practice, it can be difficult to see how implementing EBM principles may make a difference to practice. However, adopting practices consistent with evidence-informed practice – using evidence when available to guide decision making – may shift the practice culture to improve patient care. While Strauss[11] described 5 steps of EBM (asking a question, finding the evidence, applying information in combination with clinical experience and patient values, and evaluating the outcomes), a practitioner must start this approach with a 'spirit of inquiry'.[12]

### *2.1.1. Spirit of inquiry*

Osteopaths should have a spirit of inquiry,[12] a curiosity about the best evidence to guide clinical decision making. If a practitioner believes they already know everything or that clinical secrets can only be obtained from esoteric experiential practices, that modern research has nothing to offer, then the practitioner is unlikely to embrace evidence-informed practice. Willingness to change when there is good reason to do so is important for clinicians as well as the profession.

### *2.1.2. Search for evidence*

Keeping informed can be daunting for those unaccustomed to searching electronic databases and reading papers. For osteopaths, subscriptions to relevant journals (membership of many professional associations provides electronic access to osteopathic and manual therapy journals) is a place to start. Glance over the contents, skim the abstracts of interesting articles, and read further if there is relevance to your clinical practice. Many osteopathic and manual therapy journals provide evidence summaries, comment on clinical guidelines, and review articles, which may offer evidence to guide decision making.

Practitioners should ask questions and research patient problems. When presented with a new or a difficult problem, practitioners should spend time researching the problem. In addition to consulting textbooks, practitioners are also able to access information using the free PubMed service or Google Scholar, which have links to primary research articles or other clinical information. When searching electronic databases, the PICOT (population, intervention, comparison, outcome, timeframe) approach is useful for identifying keywords and phrases.[11, 13] Osteopaths should develop a culture of seeking knowledge, looking at every patient encounter as a challenge to learn more.

### *2.1.3. Integrate evidence with clinical experience*

Critical appraisal of research involves determining if the results are valid, if they are important, and if they will improve patient care. Critical appraisal may initially be difficult for those unfamiliar with this approach, and osteopaths are encouraged to participate in journal clubs to discuss articles and learn about the process of article critique.

Evidence-informed practice involves assessing the relevance of existing evidence with the needs of the patient and integrating this knowledge with our own experience, other forms of evidence (expert opinion, physiological rationale, etc), and the patient's expectations and needs during treatment. In short, evidence-informed practice uses evidence to make informed decisions and guide treatment for the benefit of patients. Working within evidence-based guidelines, treatments should be consistent with current research, but the flexibility to use treatments according to the judgment of the clinician (based on previous experience, awareness of patient values or preferences) should be utilized. Practitioners may use research evidence and clinical guidelines to *add* techniques to what they use for best patient care, rather than removing treatments with anecdotal or theoretical rationale, but this will depend on the available evidence relevant to the patient presentation.

### *2.1.4. Evaluate outcomes*

By evaluating the effect of a change in practice approach, an osteopath can assess whether the change has been beneficial. This may be difficult to determine because of the heterogeneity of patients and their complaints, however, if standard outcome measures are used (validated self-reported questionnaires, visual analogue pain scales, the Oswestry Disability index, Neck Disability index, etc) then evaluation becomes more objective.

## 2. Evidence-informed approach to muscle energy

Like many manual therapeutic approaches, the efficacy and effectiveness, of MET technique are under-researched, and there is little evidence to guide practitioners in the choice of the most useful technique variations (such as number of repetitions, strength of contraction, duration of stretch phase), causing frustration for those endeavouring to integrate relevant evidence into practice. A limited but growing number of studies show positive change following MET intervention. Studies that demonstrate an increase in the extensibility of muscles[14-19] and spinal range of motion[20-24] support the rationale of treating patients with reduced mobility, although research involving clinical outcomes is scarce. One case study series[25] and one RCT[26] for the treatment of acute low back pain (LBP) are the only English language studies that examined MET as the sole treatment using clinical outcomes. Both reported decreased pain following treatment. The lack of clinically relevant research is not surprising given that MET is typically used in conjunction with other techniques. Several clinical trials investigating osteopathic management of spinal pain have included MET as a treatment component, and given that treatment significantly reduced the reported pain and disability in these trials, they provide further support for the effectiveness of muscle energy, at least as part of a treatment package.[27-29] While there is need for further investigation of muscle energy, available evidence supports the use of this approach to treat restricted mobility and spinal pain.

Although limited evidence exists for the efficacy of muscle energy, the current research literature indicates a need to reconsider the clinical diagnostic methods and the physiological mechanisms causing therapeutic effect. The mechanisms underlying the possible therapeutic effects are largely speculative, but evidence supports the plausibility of several modes of action.

An understanding of the likely mode of action may inform and influence the application of muscle energy.

## ***3.1. Diagnostic concepts***

Drs. Mitchell, Sr and Jr, integrated clinical and anatomical observations and developed their approach based on Fryette's physiological spinal coupling concept[30] and a pelvic biomechanical model developed in conjunction with Paul Kimberley.[1] Their approach has been adopted by most North American authors of MET texts[1, 31-35] although authors elsewhere have not always linked the technique to these models.[36] Recent evidence casts doubt on the predictability of spinal coupled motion and raises questions about the validity and reproducibility of many of the recommended diagnostic tests.

### *3.1.1. Assessment of the spine*

The traditional paradigm for diagnosis and treatment is mechanical, where multiple planes of motion loss are determined and each restrictive barrier is engaged to increase motion in all restricted planes.[1, 31-35] The identification of motion restriction has been based on the spinal coupled motion model proposed by Fryette,[30] which describes two types of coupled motion restriction: Type 1 (rotation and sidebending to opposite sides) is based on spinal asymmetry detected in neutral postures, while Type 2 (rotation and sidebending to the same side) is based on asymmetry in non-neutral spinal postures. Fryette's model has been criticized for its prescriptive diagnostic labelling and dubious inferences from static positional assessment.[37, 38] Further, it allows only three combinations of multiple plane motion restrictions: a neutral Type 1, a non-neutral Type 2 with flexion, or a non-neutral Type 2 with extension. The model does not allow for other combinations, such as rotation and sidebending to opposite sides with extension, and techniques for these combinations of motion restriction are not found in texts.

Osteopathic texts advocate detection of dysfunctional spinal segments by using the diagnostic criteria of segmental tenderness, asymmetry, restricted range of motion, and altered tissue texture.[1, 31-33, 39, 40] The validity, reliability, and specificity of these criteria have been questioned,[41-43] given only palpation for tenderness and pain provocation has acceptable interexaminer reliability. Using a combination of criteria (as suggested by osteopathic texts) that include tenderness or pain may improve the reliability of osteopathic examination. MET texts commonly suggest the assessment of static positional asymmetry of the spinal transverse process or sacral base with the spine in neutral, flexion, and extension. Implicit to this approach is an assumption that a transverse process posterior or resistant to posterior-anterior springing represents a restriction of rotation to the opposite side, and inferences about coupled sidebending are made according the spinal posture. Although muscle asymmetry and anatomical vertebral asymmetry are complicating factors, they are not considered. Additionally, assessment of segmental static asymmetry has been shown to be unreliable,[44] and spinal coupled motion in the lumbar, thoracic, and cervical spine is inconsistent between spinal levels and individuals.[38, 45-50] Coupled motion in the upper cervical region is relatively consistent,[51] but inconsistencies in the lumbar and thoracic regions invalidate the Fryette model when predicting triplanar motion restrictions based on static asymmetry or single plane motion restriction, as recommended in many texts.[1, 31-35]

### *3.1.2. Assessment of the pelvis*

Sacroiliac motions are small and complex, involving simultaneous rotation and translation.[52, 53] The sacroiliac joint has no primary motion but acts passively to accommodate torsional stress during ambulation,[52] and the axes of motion are dependent upon the surface topography of the joints, which vary between individuals. Mitchell and others[1, 31-35] advocate sacroiliac motion testing during standing and seated flexion to determine landmark asymmetry and the type of dysfunction, however, the usefulness of these tests is not supported by the literature.[54-57] Forward flexion tests have poor reliability and lack construct validity.[58-60] The reliability of pelvic landmark asymmetry is poor,[60-63] unless substantial asymmetry exists.[64] Clusters of sacroiliac tests, mainly pain provocation, appear to have clinical utility,[54, 55, 57] but are generally not recommended by MET texts, having utility for detecting a symptomatic joint, rather than sacroiliac dysfunction.

The construct validity of pelvic asymmetry as an indicator of dysfunction is also lacking, but some evidence suggests asymmetry may have functional implications.[65, 66] Although pelvic torsion appears unrelated to LBP or positive clinical tests,[67, 68] subtle pelvic torsion may create an asymmetrical load on the lumbar and thoracic tissues.[65, 66] Sacroiliac motion in healthy volunteers is typically symmetrical, and asymmetrical motion (hypermobility rather than restricted motion) may be predictive for pelvic pain.[69-72]

Sacroiliac dysfunctions proposed by Mitchell are clinical constructs, rather than definitive clinical entities. The absence of objective indicators of mechanical dysfunction of the sacroiliac joint and poor reliability of the motion tests used to detect it make sacroiliac dysfunction difficult to validate. Nevertheless, variability of sacroiliac anatomy and motion may cause the described dysfunctions in susceptible individuals. Pelvic asymmetry, however, may be secondary to myofascial imbalance. One study[73] found electrical activation of the pelvic floor muscles produced a large effect on pelvic alignment. MET techniques involve contraction and stretch of myofascial structures and if muscle imbalance and altered tone has a role in producing pelvic asymmetry, it is possible that MET may influence pelvic alignment and functional symmetry by affecting myofascial tissues, rather than directly affecting the sacroiliac joint.

### *3.1.3. Implications for assessment in clinical practice*

With dubious reliability and validity for many tests of spinal and pelvic dysfunction, practitioners following an evidence-informed approach will be frustrated. Until we have tests with better clinical usefulness, the practitioner should use those tests with face validity and clinical utility based on experience, be cautious about making firm conclusions based on single clinical findings, and use a variety of tests that support a logical clinical reasoning process.

Due to the unpredictability of coupled motions in the spine, practitioners should address motion restrictions that present on palpation (despite issues of reliability), rather than assumptions based on biomechanical models and static palpatory findings. If corrective motion is introduced in the primary planes of restriction, spinal coupling (in whatever direction) will occur automatically – due to the nature of conjunct motion –without being intentionally introduced by the practitioner. Therefore, the pragmatic approach addresses the primary motion restriction(s); coupled motion will occur without the aid of the practitioner.

Despite the shortcomings of many of the pelvic and sacroiliac assessment methods, a pragmatic approach uses a cluster of tests, incorporating motion and provocative testing, not relying on a single isolated finding. Practitioners should not assume every asymmetrical pelvis is dysfunctional and warrants treatment. For flexion tests, a difference between standing and seated observations may be significant, but indicating asymmetry in the pelvis and/or lower extremity, rather than sacroiliac dysfunction. Practitioners should consider that pelvic asymmetry may be caused by myofascial imbalance (asymmetry of length, strength or activation pattern) articular dysfunction, and attention should be given to assessment and treatment of these tissues.

## ***3.2. Therapeutic Mechanisms***

The proposed mechanisms underlying the possible therapeutic effects of MET have been largely speculative. Research examining the physiological mechanisms of MET is ongoing, however the current evidence challenges some of the proposed therapeutic concepts. The underlying therapeutic action may involve a variety of neurological and biomechanical mechanisms, including hypoalgesia, altered proprioception, motor programming and control, and changes in tissue fluid.[74-77] MET may also have physiological effects regardless of presence or absence of dysfunction.[22, 23] An understanding of the likely physiological therapeutic mechanisms underlying manual techniques may assist an evidence-informed approach for technique selection.

Reflex muscle relaxation is commonly cited as a mechanism for length, range of motion (ROM), and tissue texture changes following muscle energy.[1, 31, 36, 78] However, studies support increased tolerance to stretching (hypoalgesia), not reflex relaxation, as the mechanism for increasing muscle extensibility.[14, 16, 76, 79] Although reflex relaxation appears plausible from studies examining muscle contraction with electrophysiological parameters,[80-82] no study has shown a decrease in electromyographic (EMG) activity following muscle energy. On the contrary, MET and similar techniques have increased the low-level EMG activity during and following stretching, despite an increase in muscle length.[16, 19, 83, 84] Evidence of EMG disturbance in the paraspinal muscles of patients with LBP exists,[85, 86] but no study has investigated MET and EMG activity in the spine. Thus, factors other than reflex muscle relaxation seem responsible for muscle extensibility and ROM following these techniques.

Applications of MET to stretch and increase myofascial tissue extensibility seem to affect viscoelastic and plastic tissue property,[87, 88] autonomic-mediated change in extracellular fluid dynamics,[89] and fibroblast mechanotransduction,[89, 90] but few lasting changes in human muscle properties have been found.[76] Studies measuring pre- and-post force (torque) show little viscoelastic change after passive or isometric stretching and indicate that muscle extensibility is due to increased tolerance to an increased stretching force.[14, 16, 79] Although short- and medium-term application of stretching and MET may alter the perception of pain, it does not appear to affect the biomechanics of healthy muscle, but studies are required for injured and healing muscle tissue.

MET may influence pain mechanisms and promote hypoalgesia. Studies suggest MET and related post-isometric techniques reduce pain and discomfort when applied to the spine[26] or muscles.[14, 16] The mechanisms are not known, but may involve central and peripheral modulatory mechanisms, such as activation of muscle and joint mechanoreceptors that involve centrally mediated pathways, like the periaqueductal grey (PAG) in the midbrain, or non-opioid serotonergic and noradrenergic descending inhibitory pathways. Animal and human studies have shown sympathoexcitation and localised activation of the lateral and dorsolateral PAG from induced or voluntary muscle contraction,[91, 92] and activation of non-opioid descending inhibitory pathways from peripheral joint mobilization.[93, 94] Additionally, MET may increase fluid drainage and augment hypoalgesia. Rhythmic muscle contraction increases muscle blood and lymph flow rates,[95] and mechanical forces acting on fibroblasts in connective tissues change interstitial pressure and increase transcapillary blood flow.[96] MET application may reduce pro-inflammatory cytokines and desensitize peripheral nociceptors.

MET may also produce changes in proprioception, motor programming, and control. Spinal pain disturbs proprioception and motor control, causing decreased awareness of spinal motion and position[97-101] and cutaneous touch perception.[102, 103] Spinal pain affects motor programming, inhibiting the stabilizing paraspinal musculature, while causing superficial spinal muscles to overreact to stimuli.[85, 86] No study has investigated the effect of MET on proprioception or motor control, but limited evidence suggests benefit from other manipulative treatments.[104-108] Since MET produces joint motion while actively recruiting muscles, it may affect proprioceptive feedback, motor control, and motor learning; this should be investigated in the future.

Authors of MET texts have proposed that the technique improves lymphatic flow and reduces edema,[1, 109] and evidence from muscle contraction and physical activity studies support this. [95, 110, 111] Muscle contraction increases interstitial tissue fluid collection and lymphatic flow,[95, 111] and physical activity increases lymph flow peripherally in the collecting ducts, centrally in the thoracic duct, and within the muscle during concentric and isometric muscle contraction.[95, 110] MET may assist lymphatic flow and clearance of excess tissue fluid to augment hypoalgesia, changing intramuscular pressure and the passive tone of the tissue.
The mechanisms outlined above may explain some of the therapeutic action of MET technique, but are not likely to be specific to this technique and will possibly be activated by any physical activity that produces muscle contraction. It is argued that MET applied specifically to a painful and dysfunctional region may produce local changes in circulation, inflammation and proprioception, and although these proposed mechanisms appear plausible they are still largely speculative. The relative efficacy of specifically applied MET compared to general physical activity has not been explored and would help to determine the usefulness of MET for regional pain and dysfunction.

## 3. Evidence-informed application of muscle energy

The implications of the current research literature are more pertinent for theoretical concepts of MET than to its use in clinical practice. As discussed previously, MET may be useful for increasing muscle extensibility and spinal range of motion and for low back and neck pain. However, clinicians should be circumspect about the structural diagnosis process and not rely on isolated diagnostic tests and findings. While studies have examined the efficacy of technique variations,[23, 112, 113] few recommendations can be made. The mechanisms underlying MET are uncertain and based on inference from related studies, but some appear plausible, allowing speculation on their clinical implications. Consistent with an evidence-informed approach, these inferences from research should be balanced with clinical experience.

### *4.1. Muscle energy for increasing muscle length*

Evidence suggests MET (or similar isometric stretching techniques) is more effective than passive stretching for increasing muscle extensibility. Due to lack of studies or conflicting evidence, little information exists about the optimal number of isometric contractions, the duration and intensity of contraction, or the force of the stretch.[76]

Evidence for the most effective direction of contraction to increase flexibility in healthy muscle does exist. To gain maximum ROM and muscle extensibility, the use of isometric variations that include recruitment of the agonist muscle is suggested. Agonist-contract (AC) and contract-relax agonist-contract (CRAC) are variants of proprioceptive neuromuscular facilitation, where the patient actively pushes further into the barrier (AC) or where isometric contractions away from and into the barrier are alternated. These techniques have been consistently effective for increasing flexibility[76] but are appropriate where muscles are not painful. It is not recommended for muscles or joints that are painful because pushing into the painful barrier would likely produce protective muscle guarding and apprehension.

The duration of the stretch phase for maximum gains in flexibility should be considered. Many recommend only a few seconds of relaxation before re-engaging the new barrier,[1, 31-35] but

Chaitow recommends a duration of up to 60 seconds for chronically shortened muscles.[36] Studies reporting that duration of stretch influences the amount and longevity of ROM gains support this recommendation.[114-117] Further, longer stretching durations are more effective than short durations, with 15 seconds more effective than 5[114] and 30 seconds more effective than 15 but no different than 60.[115, 116] Feland et al.[117] reported a 60-second stretch produced greater gains in ROM that lasted longer than lesser durations for elderly people with tight hamstrings, and their subjects may be representative of those with chronically shortened fibrotic muscles. .

Although no studies suggest the best application for stretching painful muscles, healing muscles, or active trigger points, gentle contraction and stretching forces with shorter durations should be used to recruit sensitised fibres (as suggested for myofascial trigger points), avoid further tissue damage, and promote repair and healing. An evidence-informed approach for painless, chronic, fibrotic muscles indicates moderate contraction and stretching forces, maintain the stretch phase up to 60 seconds, and use AC or CRAC where appropriate.

### *4.2. Muscle energy for spinal dysfunction*

The unpredictability of coupled motions in the thoracic and lumbar spine has been discussed, and practitioners should address motion restrictions that present on palpation in as many planes as identified. If motion is introduced in the primary plane(s) of restriction, coupled motion will occur automatically. If multiple plane motion restrictions are identified that do not conform to the Fryette model, technique should be adapted to accommodate the motion restrictions identified. If segments do not respond to treatment, then the diagnosis should be reassessed and clinical judgement used regarding appropriate further treatment.

The chronicity of spinal dysfunction may influence the choice of technique and approach. The aetiology of segmental dysfunction is speculative, but acute dysfunction may arise from minor trauma, producing minor strain and inflammation in the spinal unit. In acute spinal conditions, zygapophysial joint sprain and effusion may produce local pain and limited motion (active and passive). Following strain and inflammation, nociceptive pathways may be activated and initiate a cascade of events, including the release of neuropeptides from involved nociceptors that promote tissue inflammation. This neurogenic inflammation may outlast the tissue damage and contribute to tissue texture abnormality. Additionally, central nervous system motor strategies may be altered to inhibit deep paraspinal muscles and produce excitation of more superficial muscles, which may further altering tissue texture and quality of motion.[74, 77]

With acute dysfunction, techniques should promote fluid drainage, hypoalgesia, and proprioceptive input. MET should be applied to the 'first' barrier (first sense of increasing resistance to motion) as described by Mitchell,[1] with repeated gentle isometric contractions. Repetitive mid-range articulation may assist trans-synovial flow and lymphatic drainage, and indirect techniques (techniques that place the joint or tissues in a position of ease or relaxation) may have a role in reducing the secretion of pro-inflammatory peptides to minimise pain and inflammation.[118]

Chronic dysfunction is characterised by restricted range of motion, thickened tissues, and relatively little localised pain or tenderness at the site of dysfunction. Following acute injury (and probably ongoing repetitive trauma due to deficiencies in proprioception, motor control, and stabilisation), degenerative changes occur in the intervertebral disc and zygapophysial facet joints, peri-articular connective tissue undergoes proliferation and shortening, and these degenerative changes act as co-morbid conditions that continue to affect the spinal unit. Sensitised nociceptive pathways may interfere with proprioceptive processing, creating deficits in proprioception and affecting segmental muscle control, which may disrupt the dynamic stability of the segment and predispose it to ongoing mechanical strain.[74, 77]

For segmental dysfunctions that suggest a chronic condition, the most beneficial techniques may be those that stretch and mobilize tissues and improve proprioception and motor control. When applying MET to a chronic and restricted joint, engaging the barrier at the point of elastic end-range (rather than the first barrier) will load and stretch the shortened capsule and peri-capsular structures to produce viscoelastic and possibly plastic changes. Provided the localisation is maintained, more moderate contraction forces can be used to enhance post-isometric hypoalgesia and stretch tolerance and allow adequate post-contraction loading on the tissues. Isometric contraction will help proprioceptive feedback and recruitment, but controlled isotonic (eccentric) contraction – allowing the muscle to shorten over the range of motion – may also be beneficial. High-velocity, low-amplitude (HVLA) thrust technique might be used with end-range articulation, given HVLA creates cavitation and increases joint separation in the short-term, allowing end-range articulation to optimally stretch the peri-capsular tissues.

### *4.3. Muscle energy for pelvic dysfunction*

As discussed, many diagnostic tests have dubious value, and a pragmatic approach uses a cluster of tests, incorporating motion and provocative testing, and does not rely on a single isolated finding. Pelvic asymmetry may be caused by myofascial imbalance (asymmetry of length, strength or activation pattern) rather than articular dysfunction, and attention should be given to treatment of these tissues.

Osteopaths have emphasised sacroiliac dysfunction as a hypomobility lesion, but should also consider hypermobility as an aetiology for the painful joint,[119] considering that asymmetrical joint laxity is associated with pelvic pain in pregnant women.[69-72] In addition to improving perceived pelvic symmetry and function, MET may enhance motor recruitment and stability by using isotonic (eccentric) contraction to improve motor recruitment for pelvic and hip muscle weakness and atrophy.[1] The addition of motor control and stability training for these patients should be considered.[120]

## 4. Conclusion

Evidence-informed practice uses research evidence when available, followed by personal recommendations based on clinical experience, while retaining transparency about the process used to reach clinical decisions. There is a lack of high quality research regarding the efficacy and effectiveness of MET, as well as the therapeutic mechanisms, but emerging evidence supports the clinical usefulness of this technique. However, reassessment of the recommended assessment practices associated with the technique is required, and additional evidence should establish plausible therapeutic mechanisms to guide therapeutic decisions about application of the technique for different conditions.

**Acknowledgements**

The author wishes to thank Deborah Goggin, MA, Scientific Writer, A.T. Still Research Institute, A.T. Still University, for reviewing this manuscript. This manuscript was based, in part, on a previous article published in Franke H, ed. *Muscle Energy Technique: History - Model - Research (Monograph)*. Ammersestr: Jolandos; 2009:57-62.[75]

## Statement of Competing Interests

Gary Fryer is a member of the Editorial Board of the Int J Osteopath Med but was not involved in review or editorial decisions regarding this manuscript.

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