Ideomotor Movement in Pain Management

- Luke Rickards (available at: http://www.lukerickardsosteopath.net/ideomotor-movement-pain-management)

There are numerous approaches to hands-on treatment used by the manual therapy professions. In osteopathy, manual manipulative techniques are often broadly defined by the terms 'direct' and 'indirect'. Direct technique refers to the application of external force to engage a restrictive barrier and includes mobilisation with impulse technique, MET, articulation and soft tissue massage. In contrast, indirect techniques, such as functional technique, strain-counterstrain and facilitated positional release, are generally unconcerned with restrictive tissue barriers and attempt to bring about change via reflexive somatic responses.

Movement of some kind is usually an integral feature of manual therapy for the treatment of pain. While many manual therapies consist entirely of passive movements, increasing evidence suggests that over-reliance on passive treatment or coping strategies is a strong predictor of chronicity and increased risk of disability. Active management approaches and manual therapies which incorporate active components usually involve prescriptive movements and exercises aimed at addressing specific functional goals, or at specific impairments suspected to be relevant to the clinical presentation.

American physical therapist, Barrett Dorko, has proposed a unique approach to indirect manual therapy for pain problems that has led to the development of a method described as Simple Contact. Although this approach uses similar manual handling to other common indirect osteopathic manipulative techniques, the model does not rely on hypothetical pathophysiology or detailed assessment of the patient for subtle dysfunctions that are difficult to substantiate. The intent of the method is not to introduce passive movements to the patient's body, or to direct active movements, but to provide an environment and opportunity for the patient to explore greater expression of spontaneous, self-directed movements. Dorko's premise is that in people with mechanically induced or maintained pain, active movement designed to reduce the mechanical deformation of the involved tissues will emerge as an instinctive and effortless movement response. This inherent activity is called ideomotor movement, or ideomotion.

A Short History of Ideomotion

Descriptions of ideomotion have been present in the medical and psychology literature since 1852, when a lecture by William Carpenter was reprinted in The Proceedings of the Royal Institution of Great Britain. Carpenter identified ideomotion as a third category of non-conscious, instinctive behaviour, which also includes excitomotor activity (e.g. breathing and swallowing) and sensorimotor activity (e.g. eye blinking and startle reactions).

Ideomotion can be described as instinctive, automatic expressions directly coupling dominant mental representations to action without intermediary volition. Ideomotor theory suggests that motor patterns can be automatically and intimately associated with their internal and external

sensory effects and will occur in the absence of any other cognitive representation or efferent motor command. Although ideomotion has been commonly associated with involuntary movements, ideomotor theory also provides a compelling explanation for the generation of goal-oriented voluntary actions.

Ideomotor movements include the involuntary and unconscious movements that make up our non-verbal communication behaviours, such as facial expressions and changes in posture. Ideomotion contributes to complex tasks, such as operating a car while we focus on the road, and to writing or speaking the beginning of a sentence while we are mentally constructing the end of it. In addition to its expressive functions, ideomotion also has homeostatic or corrective functions, such as shifting in one's chair or changing posture to relieve discomfort, yawning, and forward motor planning to ensure end-point comfort. Ideomotion is also responsible for many illusory perceptions, such as those experienced in dowsing, the ouija board and pendulum diagnosis, the observations of applied kinesiology, and some palpatory experiences in manipulative therapy and 'energy work'.

The most frequent reference to the ideomotor effect in relation to common indirect manual therapies is explication of the potential error in associating palpatory confirmation of hypothetical physiology with substantiation of a theory. Some indirect manual treatment methods presuppose unsubstantiated physiological or pathophysiological mechanisms, and suggest that palpatory confirmation can offer sufficient evidence of these mechanisms. However, in accordance with the ideomotor principle, the anticipation of a sensory consequence itself can act as the stimulus which directly and involuntarily prompts the muscular movements that will produce it. Thus, expression of a desire or expectation to perceive hypothetical body functions, such as cerebrospinal fluid rhythms, tissue 'unwinding' or 'energy', can result in the practitioner subconsciously generating internal movements and sensations that match the practitioner's envision.

However, in the absence of anticipatory projections from the practitioner, gentle, non-provocative palpation can reveal a great deal of subtle, involuntary movement within the patient. Considering the fact that expressive and corrective ideomotor movements, large and minute, can occur almost continuously in humans unless consciously suppressed, it is possible that ideomotor activity is responsible for a significant proportion of the subtle tissue alterations observed by practitioners using some indirect techniques. Knowledge of the presence and purpose of ideomotor activity should inform our understanding and interpretation of such observations.

Ideomotion and Pain

According to the contemporary neuromatrix theory of pain, the sensations of the pain experience and accompanying motor responses coexist simultaneously as two dimensions of a multi-system output response. The perception and localisation of pain sensations occur concurrently with the generation of motor output responses designed to resolve the perceived threat to tissues. Patrick Wall has proposed that the resolution of pain thus requires an appropriate motor response, and that such a response may proceed as the result of inherent mechanisms. If this instinctive process is interrupted then guarding, altered posture and continued pain may ensue. Dorko has noted that ideomotor movements constitute the predominant expression of instinctive movement response to

both internal and external stimuli in humans during their daily activities. He suggests that enhancement of the expression of ideomotion should lead to the reduction of mechanical pain in patients whose instinctive responses have been inhibited or suppressed, and are thus experiencing continuing symptoms.

Ideomotor movements are expressed to their maximum degree unless there is an antagonistic motor representation present simultaneously in the mind. In his 1890 text, Principle of Psychology, William James explains that unless conditions are simple, full ideomotor expression is often dependent on a mental consent, or permission. Dorko argues that spontaneous bodily expression may be inhibited in the context of culturally acceptable expressions of movement or suppressed by prescriptive body expression, for example, postural correction training. Such external demands may result in the generation of simultaneous 'antagonistic representations' that distract authentic, spontaneous expressions of movement and thus manifest as isometric muscle contraction. Dorko has suggested that such muscle activity is commonly misinterpreted as a lack of appropriate relaxation, and may then be subjected to various forms of stretching, manipulation or choreographed exercise, rather than being encouraged to complete the motor response for which it was activated. The method described by Dorko endeavours simply to provide a context of 'permission' in order to encourage greater expression of ongoing ideomotor activity.

During ideomotor movements the sensory effects, such as the kinaesthetic and interoceptive sensations that may accompany each movement, are directly coupled with the generation of the movement itself. Thus a kinaesthetic representation of a position that may be associated with reduced pain sensation, or stretch of a stiffened tissue, will be automatically coupled to the movement that produces the represented sensation. The pathway from sensory effect representation to movement may also involve feedback from the peripheral sensory apparatus at levels below attention, and this sensory input may facilitate the elaboration of motor patterns at higher levels. Alterations in motor output during the movement may be generated by continuing sensory effect representations and may be influenced by both conscious and non-conscious peripheral sensory feedback, thus resulting in the complex movement patterns seen during the many expressions of ideomotor movement. Since varying interoceptive sensations may be perceived with even minute alterations in motor output (e.g. muscle relaxation), in some instances movements may not be visible, though they will often still be palpable.

Ideomotion as Therapy

Ideomotion is the somatic expression of mental imagery, attention or thought; therefore, it is always present in conscious patients. The goal of ideomotor therapy is simply to make the patient aware of this spontaneous internal activity and then allow it to proceed unhindered. Thus the patient is not directed to do any particular movement; rather they are encouraged to cease restraint of any ongoing ideomotor activity. Manual contact from the practitioner need only be just enough to be felt and draws the patient's awareness to the slightest indication of ideomotor activity. Following the patient's body with very light contact encourages more pronounced expression of these movements. It is suggested that the attitude of the practitioner toward the ideomotor movement should be one of quiet acceptance and interest, maintaining contact but avoiding inhibition or guiding in any way.

The expression of ideomotion during treatment may be quite striking, involving very slow, arrhythmic, large-range movements of the trunk, neck or limbs. This response is particularly common when the patient is standing or seated. In the supine position, movement is restricted in many directions and the response is not consistently perceptible from a visual point of view; however, palpable movements and changes in breathing and muscular tension are frequently observed. One of the dominant characteristics of ideomotion is a sense of disassociation with conscious volition behind the movement. Patients often express surprise that their body has begun to move and will either assume that the practitioner is moving them or express a sensation that some internal mechanism separate to their 'will' is responsible. It is possible that a significant advantage to the use of non-volitional movement in the treatment of pain is that subconsciously generated movement may bypass conscious fear-related cognitions responsible for some functional movement impairments resulting from pain.

Barrett Dorko facilitating ideomotor expression though gentle manual communication

Many patients experience a rapid onset of warmth throughout the skin over the spine, face, upper limbs and/or the feet, accompanied by pronounced sweating during treatment. Adoption of a deep breathing pattern may also be noted. These phenomena often commence early during the treatments and suggest a marked alteration in sympathetic tone. Such observations are considered typical by practitioners using this approach. It has been noted anecdotally that these overt reactions are commonly associated with favourable outcomes.

Rationale for Ideomotion in Manual Therapy

Motor output as a dimension of pain generally serves to both promote evasion and to limit provocation of the painful area. Evidence from PET studies suggests that cortical and subcortical motor mechanisms become activated in anticipation of movements intended to escape the noxious stimulation. For example, the premotor cortex has been shown to be significantly activated during noxious stimulation, even though the patient is stationary. However, modulation of nociception occurs at all levels of the neuraxis, generating the multidimensional experience of pain involving sensory-discriminative, affective-motivational, cognitive, autonomic, and motor components. While

ideomotor responses to pain may primarily serve to decrease or resolve noxious mechanical peripheral input, additional central mechanisms may be involved in producing pain modulation during the therapy.

Nociceptive inputs can be modulated in the CNS by other sensory inputs or by descending inhibitory influences. Facilitating mechanically non-aggressive, large-range novel movements could have therapeutic effects on central mechanisms of pain on the basis of threat reduction. The application of non-threatening and supportive touch, the emergence of novel movement patterns or the unusual sensation of non-volitional movement may facilitate inhibitory modulation via the sensory-discriminative pathways of pain. The patient-oriented approach and non-threatening context of ideomotor therapy, as well as the learning of a new self-management technique might alter affective-motivational and cognitive components. Commonly observed clinical changes, such as pronounced warmth, sweating, muscle relaxation, and deeper breathing, suggest that autonomic modulation is also involved. Non-specific and placebo mechanisms must also be considered.

Since chronic musculoskeletal pain infrequently presents at a single site of the body. Carnes et al. (2007) have suggested that in the presence of non-specific pain at multiple-sites, assessment and intervention targeted specifically at a single pain site may be inappropriate and may fail to have a significant effect on overall pain and disability. Patients presenting with multiple-site pain may gain greater benefit from less site-specific interventions. Ideomotor-based treatment typically precludes attempting to isolate treatment to a single area of the body. Although further investigation is necessary, ideomotor-based physical therapy may be a more reasonable alternative to more traditional compartmentalised manual treatments for complex, multiple-site pain presentations.

Further, it is evident that assigning the acquisition and maintenance of skills necessary for functional independence to patients rather than practitioners is highly beneficial. Although the ideomotor-based therapy involves manual contact, the resulting movements are entirely active. Once a patient has become familiar with the process of permitting spontaneous, non-prescriptive movements guided by their own kinaesthetic and interoceptive experience they can proceed independently. Consequently, it is possible for the patient to achieve similar effects from the manual intervention process on their own as they do in the presence of the therapist, thus reinforcing active coping and self-efficacy.

References:

1. Ward R (Ed). Foundation for Osteopathic Medicine. 2nd Ed. Lippincott, Williams & Wilkins, Baltimore. 2003.
2. Dorko B. The Analgesia of Movement: Ideomotor Activity and Manual Care. J Osteopathic Med. 6:93-95. 2003.
3. Dorko B. (n.d.) Without Volition: The Presence and Purpose of Ideomotor Movement. Retrieved 13th March 2006 from: http://www.barrettdorko.com/articles/ideomotor.html
4. Carpenter WB. On the Influence of Suggestion in Modifying and Directing Muscular Movement, Independently of Volition. Proceedings of the Royal Institution of Great Britain. 1852. 1:147-53.
5. James W. Principles of Psychology. Holt, New York. 1890.

6. Dorland WAN. Dorland's Medical Dictionary. 30th Ed. WB Saunders, Philadelphia. 2003.
7. Spitz H. Nonconscious Movements: From Mystical Messages to Facilitated Communication. Lawrence Erlbaum Associates Inc, New Jersey. 1997.
8. Lehmann HD. Yawning A. Homeostatic Reflex and its Psychological Significance. Bull Menninger Clin. 1979. 43:123-36.
9. Rosenbaum DA, van Heugten CM, Caldwell GE. From Cognition to Biomechanics and Back: The End-State Comfort Effect and the Middle-Is-Faster Effect. Acta Psychologica. 1996. 94:59-85.
10. Hyman R. The Mischief-Making of Ideomotor Action. Sci Rev Alternative Med. 1999. 3(2):34-43.
11. Hall H. Wired to the Kitchen Sink: Studying Weird Claims for Fun and Profit. Skeptical Inquirer: May 2003.
12. Hartman SE, Norton JM. Interexaminer Reliability and Cranial Osteopathy. Sci Rev Alt Med. 2002. 6:23-34.
13. Weigelt M, Kunde W, Prinz W. End-State Comfort in Bimanual Object Manipulation. Exp Psych. 2006. 53:143-8.
14. Keller P, Wascher E, Prinz W, Waszak F, Koch I, Rosenbaum DA. Differences between Intention-Based and Stimulus-Based Actions. J Psychophysiology. 2006. 20:9-20.
15. Kunde W, Elsner K, Keisel A. No Anticipation-No Action: The Role of Anticipation in Action and Perception. Cogn Process. 2007. 8:71-78.
16. Stock A, Stock C. A Short History of Ideo-Motor Action. Psych Research. 2004. 68:176-88.
17. Melzack R. Pain and the Neuromatrix in the Brain. J Dental Ed. 2001. 65:1378-82.
18. Moseley GL. A Pain Neuromatrix Approach to Patients with Chronic Pain. Manual Therapy. 2003. 8:130-40.
19. Wall P, Melzack R (Eds). The Textbook of Pain. 4th Ed. Churchill Livingstone, London. 1999. 1305-6.
20. Wall, P. Pain: The Science of Suffering. Columbia University Press, New York. 2000. 146-52.
21. Gove PB et al. (Eds). Webster's Third New International Dictionary of the English Language. Merriam-Webster Inc, Springfield. 2002.
22. Wyman-McGinty W. The Body in Analysis. J Analytical Psych. 1998. 43:293-60.
23. Steckler LH. Somatic Soulmates. Body Mov & Dance in Psychotherapy. 2006. 1:29-42.
24. Dorko B. (n.d.) The Origins of Simple Contact. Retrieved 13th March 2006 from: http://www.barrettdorko.com/articles/origins.html
25. Butler DS, Moseley GL. Explain Pain. Adelaide: NOI Group Publications. 2005.
26. Crombez G, Vlaeyen JWS, Heuts PH et al. Pain-Related Fear Is More Disabling Than Pain Itself. Evidence on The Role of Pain-Related Fear in Chronic Back Pain Disability. Pain. 1999. 80: 329-40.
27. Casey KL. Forebrain Mechanisms of Nociception and Pain: Analysis through Imaging. Proc National Acad Sci (USA) 1999. 96:7668-74.
28. Svensson P, Minoshima S, Beydoun A, Morrow TJ, Casey KL. Cerebral Processing of Acute Skin and Muscle Pain in Humans. J Neurophysiol. 1997. 78:450-460.
29. Riedel W, Neeck G. Nociception, Pain and Antinociception: Current Concepts. Z Rheumatol. 2001. 60:404-15.
30. Kerr CE, Wasserman RH, Moore CI. Cortical Dynamics as a Therapeutic Mechanism for Touch Healing. J Altern Comp Med. 2007. 13:59-66.
31. Zusman M. Cognitive-Behavioural Components of Musculoskeletal Physiotherapy: The Role of Control. Physical Therapy. 2005. 10:89-98.

32. Mercado AC, Carroll LJ, Cassidy JD, Cote P. Passive Coping Is a Risk Factor for Disabling Neck or Low Back Pain. Pain. 2005. 117:51-57.
33. Blyth FM, March LM, Nicholas MK, Cousins MJ. Self-Management of Chronic Pain: A Population-Based Study. Pain. 2005. 113:285-92.
34. Furlan AD, Brosseau L, Imamura M, Irvin E. Massage for Low-Back Pain: A Systematic Review within the Framework of the Cochrane Collaboration Back Review Group. Spine. 2002. 27:1896-910.
35. Gross AR, Hoving JL, Haines TA, Goldsmith CH, Kay T, Aker P, Bronfort G. A Cochrane Review of Manipulation and Mobilization for Mechanical Neck Disorders. Cervical Overview Group. Spine. 2004. 29:1541-48.
36. Kay T, Gross A, et al. Exercises for Mechanical Neck Disorders. Cochrane Database Syst Rev. 2005. 20:CD004250.
37. Brooks C. Sensory Awareness: The Rediscovery of Experiencing. The Viking Press, New York. 1974.
38. Fortrat JO, Formet C, Frutoso J, Gharib C. Even Slight Movements Disturb Analysis of Cardiovascular Dynamics. Am J Physiology. 1999. 277:H261-7.
39. Cole J. On the Relation between Sensory Input and Action. J Motor Behav. 2004. 36:243-44.
40. Knoblich G, Prinz W. Linking Perception and Action: An Ideomotor Approach. In: Freund HJ, Jeannerod M, Hallett M, Leiguarda R (Eds). Higher-Order Motor Disorders: From Neuroanatomy and Neurobiology to Clinical Neurology. Oxford University Press, Oxford. 2005. 80-81.
41. Carnes D, Parsons S, Ashby D, Breen A, Foster NE, Pincus T, Vogel S, Underwood M. Chronic musculoskeletal pain rarely presents at a single body site: results from a UK population study. Rheumatology. 2007;46:1168-70.
42. Blyth FM, March LM, Nicholas MK, Cousins MJ. Self-management of chronic pain: a population-based study. Pain. 2005;113:285-92.
43. Mercado AC, Carroll LJ, Cassidy JD, Cote P. Passive coping is a risk factor for disabling neck or low back pain. Pain. 2005;117:51-57.
44. Butler DS, Coppieters MW. Neurodynamics in a broader perspective. Manual Therapy. 2007;12:e7-8.