

# Massage Helps Relieve Muscular Pain

Judith (Walker) DeLany, LMT

Long leg, short leg, rotation, tilt, torsion, loss of range of motion, hypermyotonia, joint dysfunction, misalignment, subluxation..... The terms abound throughout health care professions to describe the numerous structural challenges that the human body can experience. Depending upon their school of approach, health care practitioners search through medications, poultices, techniques, supplements, exercises, thought patterns, tests, surgeries, books, articles, and, finally, referral lists, in an attempt to find the answers to cases which elude their solutions. Where pain and dysfunctional biomechanics are concerned, anatomy and physiology remain foundations which all health care fields share in the struggle to understand challenging cases.

## Causes of pain in soft tissues

When addressing myofascial pain syndromes, a neuromuscular therapist (NMT practitioner) focuses on six factors of physiology (among others) which cause or intensify pain in the body. If only one or two of these are considered, the pain may be eliminated, or reduced, however, results will likely be inconsistent, temporary and arbitrary. Pain may return in a few days or a few weeks because one or two of the underlying causes (perpetuating factors) continue to exist. These important factors include:

- 1) Ischemia - lack of blood and oxygen caused by muscular hypertonicity (spasm, tightness)
- 2) Trigger Points - areas of hyperirritability which cause referred pain or sensations to other body regions
- 3) Nerve Entrapment and/or Compression - pressure on nerves by soft tissue (muscle, tendon, ligament, fascia, skin) or by hard tissue (bone or disk)
- 4) Postural Distortion - when the body's alignment deviates from anatomically ideal position in coronal, sagittal or horizontal planes
- 5) Nutritional - inadequate intake of nutrients necessary for cellular metabolism and the inclusion of nutrients which are harmful, irritating and/or stimulating to the nervous system
- 6) Emotional Wellbeing - the management of stress

These six factors, individually and collectively, play a role in stimulation of the central nervous system and the peripheral tissues. The healthy human body is designed to efficiently and effectively adapt to a certain range of stimulation. When stimulation in the external and internal environment of the body exceeds the CNS's limits, changes begin to occur in the nervous system as well as the peripheral tissues (such as the muscles), including the registration of pain and the occurrence of dysfunction. A look at each of these areas will assist in understanding the

role of neuromuscular therapy in achieving a more longlasting result in pain management and treatment.

An understanding of facilitation and the facilitated segment is important. Chaitow (1988) refers to Michael Patterson's explanation of facilitation as follows:

*'The concept of the facilitated segment states that because of abnormal afferent or sensory inputs to a particular area of the spinal cord, that area is kept in a state of constant increased excitation. This facilitation allows normally ineffectual or subliminal stimuli to become effective in producing efferent output from the facilitated segment, causing both skeletal and visceral organs innervated by the affected segment to be maintained in a state of overactivity.'*

In other words, when abnormal or extensive stimulation comes into the spinal cord, whether from joints, organs, muscles, or other sources, it can set up a cycle of excessive stimulation back out to the muscle (somatic) and organ (visceral) tissues served by that nerve segment. And, in the same respect, when a therapeutic modality interrupts the reflex cycle and removes the source of abnormal stimulation, the tissues affected by that cord segment may have a reduction of hyperactivity as well. Each therapeutic modality which interrupts the reflex cycle may help to end the physiopathological reflex arc. This may explain why so many different modalities can achieve a positive result with same condition. Each of them, in its own way, reduces overstimulation of the associated cord segment as well as other perpetuating factors within the tissues.

## The normal reflex arc

In the normal reflex arc, stimulation from peripheral tissues enters the spinal cord at the dorsal (posterior) root. This stimulation may be from the skin, muscles, skeleton, fascia, ligaments, blood vessels, or organs. It may register in long nerve fibers leading up to the brain or to internuncial neurons which serve that same side or both sides of the body. These internuncial neurons can refer directly back out to the tissues as efferent impulses which travel through the ventral (anterior) root to effect a response. The efferent impulses can be magnified many times greater than the incoming stimuli. Responses can occur in the muscles, vascular structures, skin, organs and in cellular activity. This process is a normal function of the nervous system and is what allows the body to respond to its environment on a split second basis without conscious brain involvement. When stimulation from the environment occurs, (temperature change, noise factors, demands of increased muscular activity), the body can reflexively respond without the need for the brain to be consciously aware of the stimulation or the response. This means that motor activity (including muscular contraction)

can be influenced directly by the brain and also by the sensory system of that same muscle. The reflex arc can be viewed as the nervous system on a smaller scale, by which a muscle can respond to its own world without conscious influence.

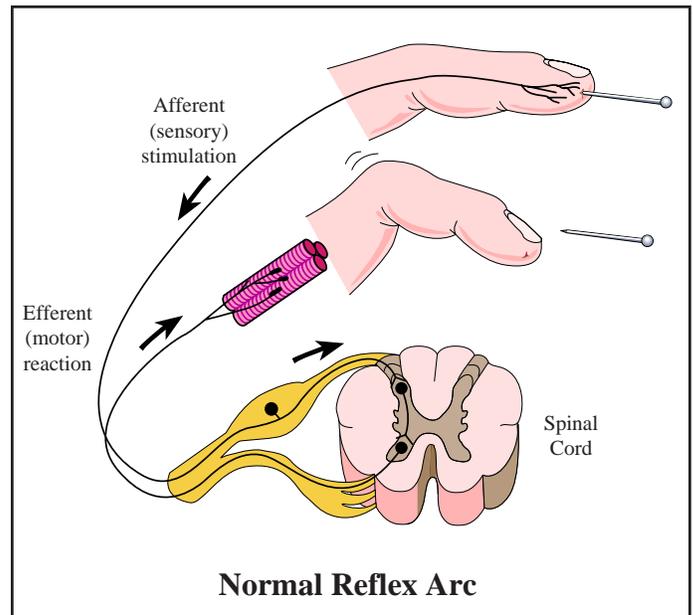
To further understand acute and chronic pain, let's spend the afternoon with Sam. Sam is a 33 years old successful computer wiz and enjoys both his high stress job and his love of sports. As Sam sits at his computer during the morning, he answers the phone on his right side. Because he is typing information from the phone conversation, he holds the phone with his shoulder, effectively shortening the levator scapula, scalenes, trapezius and sternocleidomastoid muscles on that side. His hamstrings are shortened by his constant sitting, as are his hip flexors (iliacus, psoas and rectus femoris). His back has little support and he often finds himself slumping in the chair after hours of typing. His low back ache is fairly constant, as is neck pain. Both are aggravated by his infrequent tennis, erratic running program and nonexistent stretching. Sam is an 'accident' - waiting to happen.

While working at a fast pace and under the pressure of deadlines, Sam drinks coffee in an endless stream and consumes breakfasts and lunches made of non-nutritive and neurostimulating substances, such as sugar coated, white flour pastries, colas, preservative-laced sandwiches (to which he has unknown 'hidden' allergies) and numerous junk food packets from the machine down the hall. Sam's other mealtimes have become a part of his networking time, where he meets with business associates to complete transactions and sort out problems associated with the highly competitive computer services he offers. Often he leaves the meal with indigestion and stomach upset created by the stressful conditions of doing business over dinner.

Sam has just spent the morning producing a report for one of his biggest clients. Unsatisfied with his final product, but a week past its due date, he delivers the report on his way to a lunchtime tennis match with his formidable opponent, Joe. Since he's running a little late and court time is short, Sam skips stretching his muscles (which are tight from desk postures) and passes on his warm-up strokes. He immediately serves the ball. A couple of minutes into the game, as he reaches hard for an out-of-reach ball, he feels a sharp pain in the right side of his neck. He has torn his tight levator scapula muscle. After a few more hits, the pain increases to the point he has to leave the court. Joe, sympathetic to Sam's pain, explains that a hot shower helps his own neck, so Sam heads to the showers. Instead of using ice to constrict the blood flow to the torn tissues, Sam applies hot water, which increases the blood flow to the area. After the hot shower, in an attempt to compress itself and reduce bleeding in the torn tissues, the muscle spasms even more. By the time Sam returns to his afternoon of work, his neck is immobile, his pain significant and his reflex arc well established. Sam's ischemic tissues begin to build metabolic waste deposits.

### The physiopathological reflex arc

As the reflex arc becomes well established, the metabolic wastes in the torn tissues begin to increase, including bradykinin, histamine, prostaglandins, acids, acetylcholine, excesses of potassium



ions, and proteolytic enzymes. These substances excite pain nerve endings and can even damage them. The flow of nutrients and oxygen are decreased and neurostimulation to the cord established by a vicious cycle of spasm and inflammation. The pain is now being caused by both mechanical (pressure) and chemical (waste product) stimulation. As muscular metabolism increases, pain increases. As pain increases, chemical substances are released, inducing more muscular spasm. A substantial physiopathological condition is being created in the region.

### Referred pain

As more and more ischemia and its resultant waste products build in the tissues, stimulation into the cord is significantly increased, both by the pressure and tension receptors in the muscle and by the electrochemical stimulation of the waste products. Stimulation can then create spreading of internuncial disturbances to other segments of the cord. The impulses will tend to take the path of least resistance, that is, a previously facilitated cord segment. For Sam, within a few weeks after his neck injury, his low back ache turned to constant pain and he had even begun to feel an old running injury in his left thigh (hamstrings) caused by trigger point referrals from the muscles in his lower back. The sacroiliac joint, which had been distorted by the contracted hamstrings, adds its own painful input. If left untreated, the resultant ischemia in his hamstrings, and the accompanying postural distortions, may develop into knee, ankle or foot pain as well as dysfunctional biomechanics of any or all of these joints. Sleep patterns may change and activation of other areas of the brain, such as the reticular activating system (RAS), may effect motor activity.

What we have discussed so far are individual reflex circuits, or neural pathways of information flow (stimulation and response). Millions of these responses are happening simultaneously. In fact, because of it's electrochemical nature, one sensory perception can excite many neurons. This chain of events occurs all over the body constantly, and pertaining to a variety of information. Added to

the physical stimulation may be a variety of emotional, visual, auditory, gustatory (digestive), and respiratory neurostimulating experiences. Disturbances may develop in the neural system, creating even more stimulation into the reticular activating system (RAS), a portion of the brain stem. The RAS can, in turn, create a general increase of tonus of the entire musculoskeletal system.

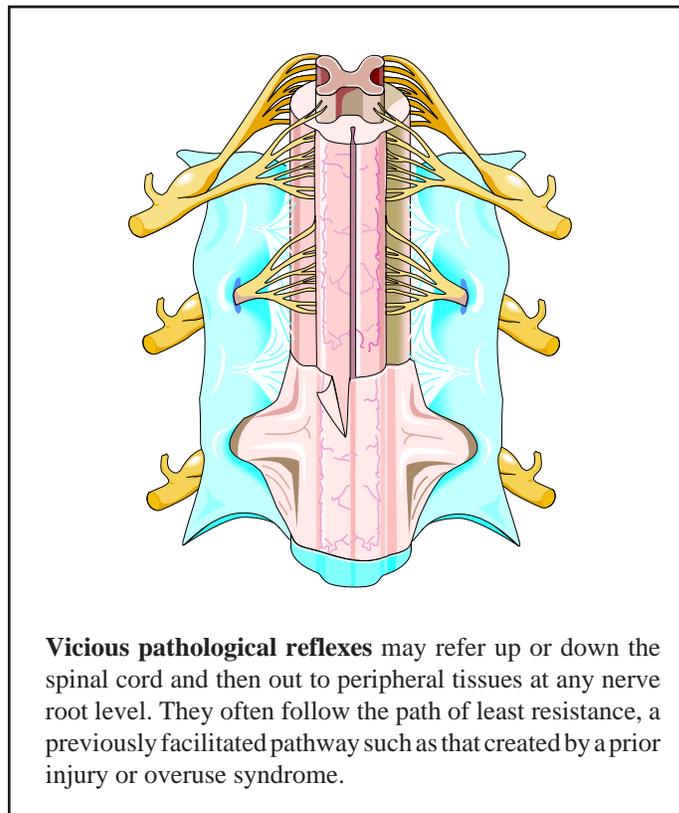
### How massage helps relieve pain

There are several ways in which massage can influence pain stimulation and pain perception. One way is through the physical removal of the waste products from the muscle tissue. As the body is kneaded, stroked and heated, blood flow is increased, taking oxygen and nutrients into the area. Lymphatic drainage is enhanced, thereby removing waste products and reducing the affects of the pain inducing chemicals. This removal of the chemical neurostimulators, is perhaps the most well understood explanation of the effects of massage. However, there are other ways in which pain is decreased by massage.

The ground substance of the fascial casing of the muscle and muscle fibers (a web-like matrix) varies from a thin, fluid (sol) state to a thick, solid (gel) state. The consistency of the ground substance can be influenced by heat, pressure, vibration, elongation and other mechanical distortions. When the muscle becomes warm from the blood flow, frictional stimulation, and other mechanical pressures, the fascia will become more liquid and malleable. The physical pressure on the muscles will be lessened as the fascia softens and the muscular contractions reduced. With the fascia in a more liquid state, the muscle may also be more easily lengthened, thereby decreasing intrajoint pressure and further reducing neurostimulating input into the cord.

As the body is touched, the pain control (analgesia) system of the brain and spinal cord can be activated. This system affects both fast (sharp) pain signals and slow (burning) pain signals, thereby influencing both acute (short term) and chronic (long standing) pain. Inhibition of pain transmission may be evoked by the release of chemicals, such as enkephalin and serotonin. These chemicals are believed to cause presynaptic inhibition of neurostimulation, that is, stopping transmission before the nerve fires to the next nerve. Other analgesic chemicals resembling opiate-like substances, such as endorphin and dynorphin, may also be released.

Inhibition of pain receptor firing can also be caused by the brain itself. In the 'gate-control theory', it is postulated that a modulating gate mechanism exists within the nervous system which controls the transmission of impulses into the cord. It is thought that incoming impulses can be overridden by other impulses, sort of like a train track which can be switched; where the tracks merge, only one train can travel at a time. When the secondary stimulation travels faster or stronger than the established reflex circuit, it can override the reflex arc, which is transmitting the pain signals. Those stimulants which can override pain transmissions may include heat, cold, acupuncture, pressure, tactile (massage), electrical stimulation, vibration, and a number of other possibilities. There is still much to be learned about these concepts.



These theories help explain why many forms of therapy affect pain, from hydrotherapy to skin rolling to TENS units. During the time of the secondary stimulation, the reflex arc is interrupted by the inhibitory gate, possibly by chemical response. If the arc re-establishes itself after the new stimulus is removed, it will usually be lessened and may be completely eliminated.

### Suggested reading:

- Chaitow L 1988 *Soft Tissue Manipulation*. Healing Arts Press, Rochester, VT
- Chaitow L 2002 *Modern neuromuscular techniques, 2nd edn*. Churchill Livingstone, Edinburgh
- Chaitow L DeLany J 2000 *Clinical application of neuromuscular techniques, vol. 1, the upper body*. Churchill Livingstone, Edinburgh
- Chaitow L DeLany J 2002 *Clinical application of neuromuscular techniques, vol. 2, the lower body*. Churchill Livingstone, Edinburgh
- Guyton A C 1986 *Textbook of medical physiology*. W B Saunders Philadelphia
- Juhan D 1998 *Job's Body, 2nd edn*. Station Hill Press, New York
- Melzack R Wall P 1982 *The challenge of pain*. Basic Books, New York.

About the author: Judith (Walker) DeLany, LMT, has been studying and developing therapeutic applications for soft tissue injury since 1983. She is a dynamic speaker on the subject of muscular pain and is currently lecturing internationally in NeuroMuscular Therapy seminars, conferences and conventions. She is a published author of books, manuals and articles on pain management and has co-authored two textbooks with Dr. Leon Chaitow - *Clinical Application of Neuromuscular Techniques, Vol. 1, the upper body* and *Vol. 2, the lower body*. She is an associate editor for *Journal of Bodywork and Movement Therapies*, (Churchill Livingstone) and has been awarded recognition for legislative work as well as outstanding instruction. Ms. DeLany's primary focus is the advancement of education in all health care professions to include soft tissue care and the myofascial treatment of chronic pain syndromes. Her diverse presentations include such events as the Florida State Massage Therapy Convention, Florida Chiropractic Association Convention, Florida Dental Hygiene Symposium, Florida Occupational Therapy Association Convention and numerous conventions in other US states, and at national and international conferences.