

NMT American version™

Foundational Platform of NMT

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The Roots and Branches of Neuromuscular Therapy

During the last several decades, neuromuscular therapy (NMT) has emerged as a significant methodology for assessing, treating and preventing soft tissue injuries and chronic pain. NMT, a series of manual treatment protocols based on the practitioner's skill, anatomy knowledge and precise palpatory application, has found its home, not only in the treatment rooms of massage therapy, but also in occupational and physical therapy, nursing, chiropractic, osteopathic and physical medicine clinics worldwide. With a foothold planted in both wholistic and traditional medicine, its future holds much promise and a look at its past (both in America and in Europe) is worthwhile.

The Roots of Modern NMT

Neuromuscular therapy techniques emerged in both Europe and North America, almost simultaneously over the last half-century. It is interesting to note that the early developers knew little, if anything, about each other, yet the theoretical basis of all the modern protocols are similar since they are each rooted soundly in physiological principles.

European Version

Between the mid-1930s and early 1940's, European-style neuromuscular techniques (as NMT is called in Europe) first emerged, developed by the skillful hands of Stanley Lief and Boris Chaitow. These cousins, trained in chiropractic and naturopathy, studied with teachers like Dewanchand Varma and Bernard Macfadden and integrated solid concepts of assessment and treatment steps for soft tissue dysfunction. Their practice of NMT was set in Lief's world-famous health resort, Champneys, at Tring in Hertfordshire, England where they were presented with a wide variety of conditions on which to test their theories and methods.

Many osteopaths and naturopaths, including Peter Lief, Brian Youngs, Terry Moule, Leon Chaitow and others, have taken part in the evolution and development of European neuromuscular techniques. NMT, now taught widely in osteopathic and sports massage settings in Britain, forms an elective module on the Bachelor of Science (BSc(Hons)) degree courses in Complementary

Health Sciences at the University of Westminster, London, a program developed (in part) by Leon Chaitow, DO.

American Version™

A few years after neuromuscular techniques emerged in Europe, across the ocean in America, Raymond Nimmo and James Vannerson first published their newsletter, Receptor Tonus Techniques, where they wrote of their experiences with what they termed 'noxious nodules'. Over the next several decades, a step-by-step system began to emerge, supported by the writings of Janet Travell and David Simons. Travell and Simons' two volume set of textbooks, *Myofascial Pain and Dysfunction: The Trigger Point Manual* (upper body published in 1983 and lower body in 1992) impacted the medical, dental, massage and other therapeutic communities with documentation, research and references for a whole new field of study - myofascial trigger points.

Eventually, several of Nimmo's students began teaching their own treatment protocols, based on Nimmo's work. Among Nimmo's students was Paul St. John, who began teaching his own system in the late 70's. In the mid-1980's, Judith (Walker) DeLany became St. John's first additional instructor of his method of neuromuscular therapy. DeLany (then Judith Walker) worked with St. John for five years (1984-89), where she assisted in the development of NMT techniques and protocols for massage therapy application. In 1989, the two separated their work into two styles. St. John's became NMT St. John Method, while DeLany's became NMT American Version™. Both systems still retain a strong focus on Nimmo's original material, although each developer has significantly influenced his or her own particular methodology with unique insights and new techniques.

European and American NMT Cross Paths

European and American versions of NMT have a similar theoretical platform yet subtle differences developed in their hands-on applications. In the exploration to uncover contracted bands or muscular nodules, American-style neuromuscular therapy uses a medium-paced (thumb or

finger) gliding stroke whereas European-style neuromuscular techniques use a slow-paced, thumb-drag method of discovery. They also have a slightly different emphasis on the method of application of ischemic compression when treating trigger points. Both versions emphasize the need to develop a home-care program and encourage the patient's participation in the recovery process.

In 1996, a landmark event for American NMT occurred when NMT American version™ was overviewed in the first edition of Leon Chaitow's *Modern Neuromuscular Techniques*, as contributed by Judith DeLany. This significant text was the first to offer both the European and American methods within the same volume.

The following year the publishers of Chaitow's text invited Chaitow and DeLany as well as internationally known athletic trainer Benny Vaughn and chiropractor/author Craig Liebenson to design the first peer reviewed journal in the field of bodywork, *Journal of Bodywork and Movement Therapies*. JBMT has proven to be a tremendously resourceful multidisciplinary publication with a strong interest in all manual modalities. Its articles focus strongly on the clinical application of all forms of soft tissue therapies and the integration of multiple disciplines of health care.

Chaitow and Delany have now published three definitive texts integrating the American and European versions of NMT. *Clinical Application of Neuromuscular Techniques, Vols. 1 & 2, with accompanying study guide*, are well on their way to establishing the standard of excellence in the training of NMT techniques.

NMT American Version™ Today

In 1999, a second edition of Travell and Simon's classic 1983 text, *Myofascial Pain and Dysfunction, The Trigger Point Manual, (Vol. 1 Upper Half of Body)*, presented substantial breakthroughs in theories and application, which altered neuromuscular therapy once again. Over the many years since the first edition was published, voluminous research has been conducted worldwide to substantiate the theories which Simons, Travell and Simons (along with contributors and an editorial team) present in this text.

The new editions offers many new treatment protocols, including a substantial emphasis on massage therapy applications and other manual techniques.

DeLany has integrated these new trigger point theories, as well as many other updates, as they apply to the practice of NMT and other manual modalities into NMT American version™. This material provides the experienced practitioner an overview of the Simons et al volume and a comprehensive view of the impact of these advances in clinical application of NMT.

School Program for NMT

The NMT American version™ school program has been successfully integrated into massage school curricula. The strength of this school version is the pace at which the routines are taught, repetition of the routines, reinforcement of primary theories of NMT, and accessibility of instructors. Students graduate their entry level programs with an in depth knowledge and substantial skill level in palpating muscles, locating and treating trigger points, and in developing treatment plans.

Educational venues that use NMT American version™ school program incorporate the traditional training manuals, handouts, Powerpoint™ programs, teacher notes, trade dialogues and other educational materials used by DeLany and other NMT Center instructors in the seminar program. Updates of new theories and breakthrough information is provided to the schools at no additional charge so that instructors stay current with the latest information.

Says DeLany, "Teachers are students first and foremost. The ability to pass on what one has learned while retaining an enthusiasm for the subject is often based on the excitement of integrating new material. The teacher should never lose sight of being a student herself and also a peer with the audience members. When these elements are lost, it is merely a lecture that transpires. When they are remembered, what presents itself is true sharing, contagious enthusiasm and a wonderful learning experience for all concerned, including the teacher."

NMT's Foundational Platform

BE INFORMED ON STATE LAWS WHERE THERAPY IS CONDUCTED.
PRACTICE WITHIN THE SCOPE OF YOUR LICENSE AND TRAINING.

The Big Picture

Homeostasis is the state of equilibrium in the body with respect to its various functions, regarding everything from postural adjustments to the chemical compositions of the body's fluids. It is through this goal of equilibrium in the normal process of day to day life that our body deals with the many stresses and expectations placed upon it. It accomplishes this through adaptation and compensation. If stresses are excessive, the adverse effects of decompensation, where frank disease and degeneration occur, may emerge as well.

Adaptation - The dynamic process wherein the thoughts, feelings, behavior, and biophysiologic mechanisms of the individual continually change to adjust to a constantly changing environment.

Compensation - A process in which a tendency for a change in a given direction is counteracted by another change so that the original change is not evident.

Decompensation - Where patterns of adaptive changes are seen to be dysfunctional and to produce symptoms, evidencing a failure of homeostatic adaptation.

Making sense of the picture

As will become clear in these courses, fundamental influences on health (musculoskeletal stress, postural influences, emotions, breathing pattern disorders) constantly mix and merge together to create the picture of health of the patient. In trying to make sense of a patient's complaints and to get to the root of the causes of resultant symptoms, it is frequently clinically valuable to differentiate these interacting etiological factors. One model which allows a focus to be brought to factors which may be amenable to change is to associate negative influences into three categories:

- *biomechanical* (overuse, misuse, trauma, disuse, congenital, etc.)
- *biochemical* (nutritional deficiency, ischemia, inflammation, toxicity, endocrine imbalance, etc.)
- *psychosocial* (unresolved emotional states, somatization, anxiety, depression, etc.).

The influences of a *biomechanical, biochemical and psychosocial* nature do not produce single changes. Their interaction with each other is profound and intervention in one category can affect the others remarkably. While it is necessary to address the influences which can be identified in order to remove or modify as many etiological and perpetuating factors as possible, it is important to do so without creating further distress or a requirement for excessive adaptation. For each therapeutic intervention, adaptation may also be required, so it is important that we do not overload the adaptive mechanisms in the healing process.

Note Chaitow & DeLany (2002), "*In truth, the overlap between these causative categories is so great that in many cases interventions applied to one will also greatly influence the others. Synergistic and rapid improvements are often noted if modifications are made in more than one area as long as too much is not being demanded of the individual's adaptive capacity. Adaptations and modifications (lifestyle, diet, habits and patterns of use, etc.) are commonly called for as part of a therapeutic intervention and usually require the patient's time, money, thought and effort. The physical, and sometimes psychological, changes which result may at times represent too much of a 'good thing', demanding an overwhelming degree of the individual's potential to adapt. Application of therapy should therefore attempt to include an awareness of the potential to create overload, and should be carefully balanced to achieve the best results possible without creating therapeutic saturation and exhausting the body's self-regulating mechanisms.*"

Local and global causes and perpetuating factors

Within these three categories are to be found most major influences on health, with a number of these features being commonly involved in causing or intensifying pain (Chaitow 1996). These include, among others, locally dysfunctional states such as:

- hypertonia
- ischemia
- neural compression or entrapment
- trigger points
- inflammation

as well as the following global factors which systemically affect the whole body:

- genetic predispositions (e.g. connective tissue factors leading to hypermobility) and inborn anomalies (e.g. short leg)
- nutritional deficiencies and imbalances
- toxicity (exogenous and endogenous)
- infections (chronic or acute)
- endocrine imbalances and deficiencies (hormonal, including thyroid)
- stress (physical or psychological)
- trauma
- posture (including patterns of misuse)
- hyperventilation tendencies.

NMT American version™ attempts to address (or at least take account of) six ‘subdivisions’ from this list, although the entire list should be kept in mind. NMT practitioners particularly address ischemia, trigger points, neural entrapments/compressions, postural imbalance, nutritional imbalances/deficiencies and emotional factors. When assessing the individual, any of these (or others from the above list) which lie outside the scope of practice and license of the practitioner should be considered for referral. The practitioner's role may be to alleviate the stress burden as far as possible, or to lighten the load, or to work toward more efficient handling of the adaptive load. It also includes teaching and encouraging the individual to alter daily habits.

The ‘Six Factors’ of NMT

When working with a person in chronic pain, six factors, in particular, should be addressed systematically to assess for and, hopefully, reduce underlying causes and/or to decrease the intensity of the discomfort. If one or more of the factors are not addressed, the person may plateau in his or her recovery or regress to a previous state of discomfort and dysfunction. The following six factors are considered with all patients and are either addressed by the practitioner or the patient is referred for assessment by another practitioner skilled in the field. If progress is not seen within a few treatments or if pain, fatigue, or other primary symptoms return, other factors, such as hormonal, organ or bone health, toxicity, etc., should be considered as possibly being primary.

1) **Ischemia** - A state in which the current oxygen supply is inadequate for the current physiological needs of tissue. Causes of ischemia can be pathological (narrowed artery or thrombus), biochemical (vasoconstriction by the body to reduce flow to a particular area), anatomical (tendon obstruction of blood flow) or as a result of overuse or facilitation. Ischemia reduces the level of oxygen, nutrients, and waste removal and the tension produced by the resultant muscle shortening can alter joint mechanics and/or entrap neural structures. Ischemia also leads to the production of trigger points.

2) **Trigger Points (TrPs)** - localized areas within muscle bellies (central TrPs) or at myotendinous or periosteal attachments (attachment TrPs) which, when sufficiently provoked, produce a referral pattern to a target zone. The referral pattern may include pain, tingling, numbness, itching or other sensations. In addition to its location (central or attachment), a TrP can be classified as to its state of activity (active or latent) as well as whether it is primary, key or satellite. (see ‘Trigger point formation theories’)

3) **Neural interferences** - compression (by osseous structures) or entrapment (by myofascial tissues) of neural structures may result in muscle contraction disturbances, vasomotion, pain impulses, reflex mechanisms and disturbances in sympathetic activity

4) **Postural and biomechanical dysfunctions** - repeated postural and biomechanical insults over a period of time, combined with the somatic effects of emotional and psychological origin, will often present altered patterns of tense, shortened, bunched, fatigued and, ultimately, fibrotic tissues with resultant alterations from healthy postural positioning

5) **Nutritional factors** - nutritional deficiencies/imbalances, sensitivities, allergies and stimulants all play roles in myofascial health as well as hormonal, emotional and mental health

6) **Emotional wellbeing** - the degree and type of the emotional and stress loads the individual is carrying can influence various systems of the body. Ultimately, if excessive or prolonged, these factors can result in distress and disease.

Trigger Point (TrP) Formation Theories

Researchers have spent decades studying trigger points and referred patterns. Much is still unclear as to why and how TrPs form and their mechanisms of referral. Expanded discussion of these theories are found in *Myofascial pain and Dysfunction: The Trigger Point Manual, Vol. 1, The Upper Half of the Body, 2nd Edn.*, (Simons et al 1999) and in *Clinical Application of Neuromuscular Techniques, Vol 1, The Upper Body* (Chaitow & DeLany 2000). Exact mechanisms of TrP formation and referral are not clear. The following theoretical platform is based on sound physiology and is the current model adopted by NMT American version™.

The Endplate Theories

A dysfunctional endplate activity occurs, commonly associated with a strain, overuse or direct trauma. As stored calcium is released at the site, *acetylcholine* (ACh) is released through calcium charged gates at the synapse, leading to an abundant and constant presence of this neurotransmitter. Resultant ischemia develops and creates an oxygen/nutrient deficit accompanied by a *local energy crisis*.

Energy (ATP) is needed in order to remove the excessive calcium. Since ATP availability is decreased by ensuing tissue tightness which restricts local blood supply, the persistent high calcium levels maintain ACh release. A vicious cycle results.

ACh transmission causes the actin and myosin elements of myofibrils to slide into a shortened position, resulting in the formation of *contractures* (involuntary, without action potential). Removal of excessive calcium requires more energy than sustaining a contracture does, so the contracture remains. The contracture is sustained by the chemistry at the innervation site, not by action potentials. These are to be differentiated from *contractions* (voluntary with action potentials) and *spasms* (involuntary with action potentials).

The actin/myosin filaments slide into a fully shortened position (a weakened state) in the immediate area around the motor endplate (at the center of the fiber). As the sarcomeres shorten, a contracture 'nodule' forms, a pal-

pable characteristic of aTrP. The remainder of the sarcomeres of that fiber are stretched, thereby creating a palpable, taut band which is also a common TrP characteristic.

Recommended criteria for identifying TrP

Essential criteria for identifying a TrP in an accessible muscle includes (Simons et al 1999):

1. a taut palpable band
2. spot tenderness of a nodule in the taut band
3. patient's recognition of pain/sensation complaint by pressure on the tender nodule.

Additionally, there may be:

1. Visual/tactile evidence of local twitch response (LTR)
2. Imaging of an LTR may be induced by needle penetration of tender nodule
3. Pain or altered sensation in the target zone associated with that TrP when provoked
4. EMG demonstration of spontaneous electrical activity (SEA) in the nidus of the TrP
5. Painful limit to full stretch range of motion
6. Muscle housing the TrP may test as weak.
7. Altered cutaneous humidity (dry or moist), temperature (cool or hot) or texture (rough)
8. A 'jump sign' or exclamation by patient due to extreme tenderness of palpated tissues

Central (CTrP) and attachment (ATrP) trigger points

The above description of a centrally located nodule describes a *central trigger point* (CTrP) which usually forms in the center of a fiber's belly and is likely associated with motor endplate activity. The CTrP is therefore defined as a palpable nodule at the center of a taut band of fibers, which, when properly provoked, will refer pain, tingling, numbness, itching or a variety of other sensations. This associated 'referral pattern' is referred to as a 'target zone'. The target zone is usually located distal to the TrP, however, it can be more central or, more rarely, can be within the local tissue where the TrP is housed.

Attachment trigger points (ATrPs) form where fibers merge into tendons or at periosteal insertions. Though they are not directly the re-

sult of endplate dysfunction (as the CTrPs are), they are indirectly a result of the CTrP since they develop at the attachment sites (periosteal, myotendinous) of the shortened contracted bands associated with a CTrP. In other words, ATrP form at attachment sites where muscular tension provokes inflammation, fibrosis and, eventually, deposition of calcium.

As noted, central trigger points are located in the center of muscle fibers while attachment trigger points form at the myotendinous junction or the periosteal attachment. This classification of trigger points will greatly influence the therapeutic application.

Referred phenomena

Both CTrPs and ATrPs are capable of producing a referral pattern to a *target zone*. These target zones are somewhat predictable and the most common ones have been well documented and charted by numerous research teams. In addition to referring sensations, TrPs are noted to refer motor activity to their target zone, often producing ischemia and formation of *satellite TrPs* within the target zone.

Although the most common TrPs have been charted and their referral patterns are fairly predictable, myofascial TrPs can form in any muscle tissue and can have varying referral patterns (sometimes extremely unusual). Therefore, thorough examination of all associated tissues is in order and an open mind regarding referral patterns should be maintained. TrPs can also form in ligaments, skin, fascia and other tissues and produce similar referred phenomena.

Active and latent TrPs

By location is not the only way to classify a TrP. It can also be classified as to its current state of activity. An '*active*' TrP is one whose referral pattern the patient recognizes as his/her common pain/sensation pattern. A '*latent*' TrP is one whose referral pattern is unusual for that patient, one he/she does not recognize as a daily occurrence or one he/she used to have and has not had for a while. All other characteristics of active and latent TrPs remain the same, except for the patient's recognition of the referral. While there remains debate in manual therapy communities as to the need to treat

latent TrPs, NMT American version™ does address them with treatment since: 1) little provocation is needed to change them from latent to active; 2) they may refer motor activity to their target zones, thereby altering tissue health; 3) tension applied by latent TrPs may alter biomechanics; and 4) treatment of them constitutes preventative therapy.

Primary, key and satellite TrPs

A *primary TrP* is one that was activated by direct trauma, acute or chronic overload, or overuse and not from activity of another TrP.

In addition to sensations, a TrP can also refer motor activity to muscles located in its target zone. When this occurs, ischemia can develop and the formation of additional TrPs associated with the 'primary' or 'key' TrP may be produced. These '*satellite*' TrPs (formerly called secondary TrPs) may develop in the target zone of a *key TrP* or may be associated with the synergists or antagonists of the muscle housing the key TrP. Deactivation of the key TrP will usually result in spontaneous deactivation of the satellite TrPs without specific treatment of the satellites. Conversely, treatment of a satellite TrP will not usually result in a satisfactory outcome until the key TrP has been deactivated. NMT American version™ recommends the examination of tissues surrounding satellite TrPs in an attempt to restore normal tissue health where needed. Additionally, other TrPs may be discovered in the examination process.

Developing palpation skills to locate TrPs

To locate and treat central and attachment TrPs, the practitioner needs to know *fiber arrangement* (fusiform, pennate, bipennate, multipennate, etc.), as well as attachment sites of each tissue being examined. Since fiber arrangement determines where the center of the fiber (not center of the muscle itself) lies, an understanding of the length, direction, and tendinous arrangement is important.

CTrPs and ATrPs form differently and are addressed differently. CTrPs are addressed with their contracted central sarcomeres and local ischemia in mind. Heat is applied to the muscle bellies, unless contraindicated. Techniques which increase blood flow and drain wastes can be

applied to the area immediately surrounding the CTrP. Gliding strokes which glide from the center of the fiber toward its attachments can be used to elongate the tissue without placing undue tension on the attachment sites. Using this method, shortened sarcomeres at the center of the fiber will be lengthened and those which are over-stretched near the attachment sites will have the tension released.

Recurring concentrations of muscular stress from the resultant CTrP contractures provoke attachment inflammation with a strong tendency toward fibrosis and calcium deposition (enthesopathy, enthesitis) and the formation of ATrPs. ATrPs should be addressed with this

tendency toward inflammation in mind. Heat is best avoided at the tendon and attachment sites and appropriate cryotherapy used until all evidence of inflammation has been eliminated.

Although both *passive and active stretches* can provide elongation of the shortened fibers, the use of these techniques should be incorporated only after inflammation has been reduced since added tension on the taut band may increase inflammation. The associated CTrPs should be released and time allowed for ATrP regions to heal before placing more tension on already distressed connective tissue attachments. Mild stretches should then be cautiously applied to avoid further tissue insult.

Common Features of Trigger Points

Primary activating factors

strain or overuse
trauma
prolonged immobilization
febrile illness
adverse environmental conditions
(cold, damp, draughts)
systemic biochemical imbalance
(eg mineral, hormonal, especially thyroid)

Secondary activating factors

compensating muscles (synergist and antagonist)
satellite triggers evolve in referral zone
nutritional deficiency (esp. C, B-complex, iron)
low oxygenation of tissues
infections
allergies (food and other)

Active and latent features

Trigger points may be either active or latent.

Active TrPs refer a pattern that the person recognizes, including pain, tingling, numbness, burning, itching and other sensations.

Latent TrPs refer a pattern which is not familiar or perhaps one the patient reports he/she used to have in the past but have not experienced recently.

Latent TrPs may become active TrPs at any time, adding to or expanding existing patterns of pain.

Activation may occur when the tissue is overused, strained by overload, stretched or shortened (particularly abruptly), chilled, traumatized (as in a motor vehicle accident or a fall or blow) or when other perpetuating factors (poor nutrition, shallow breathing, hormonal imbalance) provide less than optimal conditions of health.

An active TrP may become latent, with its referral pattern 'disappearing' for brief or prolonged periods of time.

The active TrP may then become reactivated with its referral patterns returning for no apparent reason, which may confuse the patient as well as the practitioner.

Trigger Point Treatment Options

- trigger point pressure release (as in NMT)
- chilling techniques (cryospray, ice, spray and stretch)
- dry or wet needling (acupuncture, injection)
- positional release methods
- muscle energy (stretch) techniques
- myofascial release methods
- combination sequences
- correction of associated osseous dysfunction, possibly involving high velocity techniques (HVT) and/or other osteopathic/chiropractic mobilization methods
- education to correct perpetuating factors (posture, hormonal, diet, stress, habits, etc.)
- self-help strategies (stretching, hydrotherapies, etc)

Which Method is More Effective?

Researchers at the Department of Physical Medicine and Rehabilitation, U of C used:

1. ice spray and stretch (Travell & Simons approach)
2. superficial heat applied by a hydrocolator pack (20 to 30 minutes)
3. deep heat applied by ultrasound (1.2 to 1.5 watt/cm² for 5 minutes)
4. dummy ultrasound (0.0 watt/cm²)
5. deep inhibitory pressure soft tissue massage (10 - 15 minutes of modified connective tissue massage and shiatsu/ischemic compression)

24 patients with active triggers in the upper trapezius (present for over 3 months)

The pain threshold of the trigger point area was measured using a pressure algometer 3 times pre-treatment and within 2 minutes post-treatment.

The average was recorded on each occasion.

A control group members were similarly measured twice (30 minutes apart) and received no treatment until after the second measurement.

The results showed that all methods (but not the placebo ultrasound) produced a significant increase in pain threshold following treatment with the greatest change being demonstrated by those receiving deep pressure treatment (which equates with the methods advocated in NMT).

The spray & stretch method was the next most efficient in achieving reduction in pain threshold.

Research reference: Hong C-Z Chen Y-C Pon C Yu J 1993 Immediate effects of various physical medicine modalities on pain threshold of an active myofascial trigger point. Journal of Musculoskeletal Pain 1(2)

Applications of NeuroMuscular Techniques

The following guidelines will help develop effective application of NMT techniques. As the necessary skills are attained and anatomy knowledge enhanced, each person will develop his/her own style by blending NMT knowledge with that acquired from other disciplines studied.

LICENSING - Laws regarding scope of practice vary from state to state and among the many health care professions. Most states require a 'license to touch' in order to treat patients. NMT Center suggests that each practitioner perform within the scope of his/her own license regardless of what is taught within the NMT class. NMT courses are taught to multiple disciplines in many different states and countries and may contain techniques that lie outside of the scope of a particular license. It is each practitioner's responsibility to know his/her scope of practice and to work within the boundaries of licensure.

PATIENT POSITIONING - A supine position is enhanced with knee support and a prone position benefits from foot support. A sidelying position requires support of the cervical region and upper leg to avoid undue stress on the spinal column. Other bolstering can also be used as needed. In this manual, "upper hand" refers to the hand closest to the patient's head and "lower hand" refers to the hand closest to the patient's feet when the practitioner is positioned at the side of the table and facing the patient.

TOOLS - The practitioner's thumbs are primary treatment tools and will be frequently used. Their sensitivity, which is enhanced with use, is greater than most other body parts. Caution should be exercised regarding proper positioning of the practitioner's hands and thumbs to avoid structural stress. Overuse should be avoided, especially when evidence of inflammation is present. Hands, forearms, elbows, and pressure bars are also used as treatment tools. Pressure tools, as well as hands, face rests and table surfaces, should be cleansed after use.

ORDER OF THE ROUTINES - The suggested order in which the techniques are applied is designed to effectively develop palpation skills, to enter the tissues by layers, to treat the proximal portion of an extremity before the

distal portion, and to best manage the therapy time. When the order is altered, two rules apply:
1) superficial tissues are treated before deeper layers and
2) the proximal portion of any extremity is addressed before the distal.

Each step of the 'routine' is performed in the initial examination to assure maximum results as skipping some steps may result in less than desired outcomes. In most steps, dry work (if being used) is applied first, followed by gliding strokes or manipulation. Treatment of TrPs is usually done last, after several repetitions of gliding have been completed. Gliding strokes can be applied again after TrP treatment. Applied pressure used with gliding or compression can be progressively increased, if appropriate.

LUBRICATION - Use of light lubrication will vary from muscle to muscle depending upon the technique used. Since some muscles become difficult to palpate when oiled, dry techniques should be applied first, such as connective tissue work or tissue lifting techniques. Generally, gliding procedures require lubrication while friction and tissue lifting techniques do not.

USE OF PROTECTIVE BARRIERS

Latex Allergy Alert - Since universal precautions were initiated in the late 1980's to prevent communication of diseases, such as HIV and hepatitis, exposure to latex products has increased significantly. Latex is used in the production of medical supplies (including gloves), paints, adhesives, balloons and numerous other common products. It has only been recognized within the last 15 years as a cause of serious allergic reactions.

Defensive reactions by the immune system against normally inoffensive substances often produce allergic responses. As with most allergic and sensitivity reactions, great variations exist in the degree of severity displayed, ranging from no apparent reaction, to mild or severe skin eruptions, respiratory complications and, rarely, death. Latex is composed of proteins, lipids, nucleotides and cofactors. The protein element is thought to be the cause of allergic response, while the powders, which are often

used to coat the glove to make them easier to get on and off, provide the protein with additional airborne capabilities. Increased exposure to latex is apparently associated with increased sensitivity, and onset of allergic reaction often appears insidiously. Although the exact connection is not fully understood, those people who are allergic or sensitive to avocado, banana, kiwi and chestnut are often also latex sensitive.

Allergic responses may include hives, dermatitis, allergic conjunctivitis, swelling or burning around the mouth or airway following dental procedures or after blowing up a balloon, genital burning after exposure to latex condoms, coughing, wheezing, shortness of breath and occupational asthma. Extreme cases may result in anaphylactic shock which may prove fatal.

At times, such as when working intraorally, it is necessary to use artificial barriers to protect the practitioner as well as to protect the patient. The Centers for Disease Control and Prevention (CDC) now recommends avoidance of latex gloves in favor of nitrile gloves or a less hardy choice of vinyl gloves. Avoidance of exposure is certainly recommended for those people who are already latex sensitive, and may also be the best course of action for everyone to avoid future development of sensitivity.

MANUAL TECHNIQUES of NMT

- **SKIN ROLLING AND TISSUE LIFTING** techniques are used to soften the fascia associated with the skin and underlying muscles. The skin can be grasped and lifted, thereby creating mechanical tension on the subcutaneous fascia. It can also be rolled between the fingers and thumb. Subcutaneous tissue layers and/or muscle bellies may be grasped, lifted, and manipulated between the fingers and thumb, to stretch fascia and separate fascia layers.

- **GLIDING STROKES** (effleurage) can be used to assess and treat myofascial tissues. While varying speeds of hand strokes are appropriate in myofascial applications, a moderate gliding speed helps assure proper palpation and assessment of muscles. A rapid gliding stroke may result in the practitioner skimming over congestion, taut bands or other important alterations in tissue consistency without identifying them. Additionally, rapid strokes may be uncomfortable or stimulating to the patient.

Gliding strokes that are performed too slowly may disperse the tissues, making precise tissue identification difficult. Increased repetitions may result in a significant increase in blood flow. Clinical experience suggests that most practitioners will develop a heightened sensory perception of nodules, taut bands, tissue congestion, and other palpable findings when strokes of a moderate speed are consistently used.

- **COMPRESSION** can be used to press soft tissues against a bone or underlying muscle (flat compression) or the non-lubricated tissues may be lifted and grasped between the finger(s) and thumb (pincer compression). Pincer compression can be broadly applied with flattened fingers (like a clothespin) or precisely applied with curved fingers (resembling a "C" clamp).

- **STATIC COMPRESSION** (ischemic compression, sustained pressure, or TrP pressure release) applies pressure to tissues without movement of the fingers or thumb. Tissues which are ischemic, extremely tender or which contain TrPs usually respond well to static compression.

- **COMPRESSION WITH MANIPULATION** can be applied to the tissues by lifting the tissues and then rolling or twisting them between the fingers and thumb. It is an effective way to separate the fibers, increase blood flow and to apply mechanical distress to the connective tissue to help alter its ground substance. Generally, this technique is used after the tissue tenderness has been decreased by the use of gliding strokes and static compression. It can follow those techniques or precede TrP release.

- **FRICTION** can usually be applied to myofascial tissues with variations, depending upon the condition of the tissues and the desired results. Friction techniques may include those applied with the fiber direction (longitudinal friction) or those applied transversely (cross-fiber friction, strumming or transverse friction). Caution should be used if tissues are tender which may be indicative of inflammation. If significant tenderness is present or if application of friction results in tenderness, ice may be applied (following the steps below noted for acute injury).

- **APPLICATION OF STATIC PRESSURE** to soft tissues can be an effective means of reduc-

ing spasm and contractures as well as deactivating TrPs. While the blanching effects of applied compression may enhance blood flow when pressure is released, restriction of blood flow can produce an ischemic state if held too long. If the tissue is extremely tender, the patient may not tolerate long applications of pressure. The amount and duration of pressure appropriate for an individual can vary greatly, even within different muscle fibers. Tissue oxygenation, past trauma, previous therapies, general nutritional health, mineral imbalances, tissue toxicity, and dysfunctional postures all appear to influence the amount of pressure to use.

- **BE SPECIFIC WHEN APPLYING PRESSURE** to dysfunctional soft tissues. To most successfully treat ischemic tissues or TrPs, the practitioner should be directly on the TrP and/or ischemic tissue rather than next to it. When the patient keeps asking for more pressure, moving the point of pressure slightly one direction or another may reveal that the practitioner was close to, but not right on, the desired spot.

- **HOW LONG TO APPLY STATIC PRESSURE** will vary, however, the tissue should begin to soften within 8-12 seconds. Pressure can be maintained up to 20 seconds, however, the practitioner should feel the tissues "melting" under the pressure within 8-12 seconds. The patient may feel this "melting" sensation and report that it feels as if the practitioner is lightening the pressure. A reduction of discomfort may be achieved with pressure which lasts longer than suggested, however, clinical experience suggest that increased pain and a decreased mobility often result when overly sustained or heavy pressure is used. Pressure should be constant and may be mildly increased as the tissues begin to soften.

- **THE AMOUNT OF PRESSURE APPLIED** will vary and usually matches the tension palpated in the tissues. Pressure that is too light may not produce a response, while heavy pressure may result in reflexive spasms. Ideal pressure often results in tissues softening within 8-12 seconds. If release has not started within 12 seconds, pressure should be adjusted (usually less).

How does one determine the amount of pressure to use? In addition to matching the tension within the tissues, a 1-10 scale of patient

discomfort in the treated tissues may be used to help guide the practitioner. With 1 being a feeling of pressure only and 10 being extremely painful (which is to always be avoided!), a 5, 6, or 7 is ideal. Only enough pressure to elicit a mild to moderate state of discomfort (5, 6, 7) is used. The 9 or 10 ("biting the bullet" "digging it out") has no advantage in NMT.

- **RETURN TO THE AREA BEING TREATED SEVERAL TIMES** rather than sustaining work in one area until it "releases". A greater, long lasting effect will be gained when the practitioner returns to an area 4-5 times for 8-12 seconds rather than treating once for 60 seconds. In the time between applications, the lymph and vascular systems will effectively remove waste and enhance blood flow, usually resulting in a better outcome. The degree of pressure used may need to be periodically adjusted.

COMMUNICATION DURING THERAPY

Clear communication is important for both the practitioner and the patient. The patient can better assist and become involved in understanding his/her body when the practitioner understands what brought on the condition and what helps to relieve it. A case history with full medical background of the condition will help guide the practitioner to use the appropriate protocols for treatment and to avoid those which are contraindicated. The following questions are frequently used to guide the session.

- *What is tender upon palpation?* Healthy, flexible tissues are not tender with appropriate pressure. Ischemic tissues and TrPs are usually tender. It is important to chart tender tissues.

- *Are there referred sensations of pain, heat, tingling, cold, numbness, itching, or any other sensations to other body parts when the tissues are pressed?* TrPs will refer sensations to other parts of the body. The location and target zones of referral as well as the type of referred sensations are important to know and chart. These should be compared to the person's chronic pain patterns and should be reassessed at each treatment session.

- *Is there a release of discomfort produced by pressure for 8-12 seconds?* TrPs and ischemia may be reduced and, ultimately, normal tonus and tissue health restored to the area.

Working with Acute and Chronic Conditions

ACUTE: NMT is **NOT** used on the injured tissues for the first 72-96 hours, however, can be applied to other parts of the body during this initial phase. Lymph drainage and appropriate cryotherapy may be used during this initial period. The person should be referred for appropriate medical, osteopathic, or chiropractic care, as needed. "RICE" serves as a helpful reminder of cautions to exercise with acute injuries.

Rest the tissues. Do not use NMT for first 72 hours.
Ice the tissues to decrease blood flow and swelling.
Compress the tissue with bandaging, if appropriate.
Elevate the injured part to help decrease swelling.

CHRONIC PAIN is considered to be that which remains at least three weeks after the injury with stages of subacute being between acute and chronic. When working with chronic conditions, the following four steps of soft tissue therapy should be followed in the order listed.

1. *Decrease the ischemia and TrPs* in the soft tissues with NeuroMuscular Therapy (NMT), hydrotherapy and other soft tissue techniques.
2. *Restore flexibility* by stretching and movement.
3. *Rebuild strength* through mild exercise, increasing to moderate as appropriate.
4. *Build overall endurance* with conditioning exercise and weight training.

Clinical experience suggests that proper order of the above recovery steps is important. Altering this order may result in injury, increased spasm, and return or increase of pain. Each of these four steps may need to begin days, weeks, or even months apart depending upon the condition of the soft tissues. In most cases, the patient did not achieve his/her present state abruptly. NMT, a powerful tool for eliminating pain, may help considerably, however, a commitment to selfcare and changes in lifestyle may be necessary for long lasting results.

POST-TREATMENT SORENESS may occur. It is important to warn the patient that a degree of soreness may result from NMT applications and also from homework, such as stretching and exercise. Soreness can result from an inappropriate degree of pressure, tissue trauma or as a result of pre-existing or resultant inflammation. Home applications of hot or cold hydrotherapy, Epsom salt soaks, mild movement therapies and other self care step may help to reduce

mild discomfort. If the degree of soreness is more than mild, adjustments in the amount of pressure used should be made. Consistent post-treatment soreness may be an indicator of use of excessive pressure, inflammation, or of hormonal or other underlying systemic factors.

MAKING AN ICE PACK

A reusable ice pack can be made by mixing 4 parts water with 1 part alcohol and freezing the mixture in self-closing plastic bags. 'Zip-close' bags are available in a variety of sizes and the ice pack can be 'custom designed' for the area which needs to be covered. The frozen mix will have a 'slushy' consistency rather than being solid. A higher proportion of alcohol will make it more fluid. A cloth can be used to temper the degree of coldness. The ice pack is applied for 10-15 minutes as the tissues experience stinging, burning, and then numbness. The ice pack is then removed and the tissue allowed to rewarm for at least 30 minutes, at which time the ice pack can be reapplied. If appropriate, this can be alternated with a hot pack for contrast hydrotherapy purposes. End with cold application to avoid tissue engorgement.

MAKING A HEAT PACK

A hot pack can be made by constructing a cloth bag which is then filled with rice, corn or other grains and heated in a microwave oven. White rice is usually the least expensive and has less tendency to produce allergic reaction than other grains. A thin washcloth or face towel can be easily folded and stitched to produce varying sizes of bags. Cross-stitching may be necessary with larger bags to provide stability and to form pockets of filler which will heat more evenly. The grain bag can be heated in a microwave oven for about 2 minutes (time will vary depending upon the oven and size of bag). A container filled with 1/2 cup of water can be heated at the same time to provide moisture, however, the bag itself should NOT be wet. Slip covers should be used and changed after each use.

CAUTION: When reheating the bag, less time is usually needed as overheating may result in hot spots which may burn the skin. Caution should be exercised in using this or any hydrotherapy.