Manual Lymphatic Drainage Therapy

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Health care providers are constantly confronted with the challenge of providing quality health care while at the same time containing escalating costs. Incorporating complementary therapies into standard health care practices can assist in escalating the healing process, enhancing general wellness, focusing on prevention, and promoting a better quality of life. This article discusses manual lymphatic drainage therapy and identifies the value of as well the indications for the therapy. A brief overview of the lymphatic system is included.

Health care providers are constantly confronted with the challenge of providing quality health care while at the same time containing escalating costs. Reimbursement issues also add pressure to our health care delivery system. The overall message seems clear. To manage multiple constraints, we must strive to become more innovative, comprehensive, and effective in the delivery of health care. Approaching client care in a holistic manner can assist in enhancing the healing process, promoting wellness, focusing on prevention, and promoting a better quality of life. There is a strong interest in optimizing the provision of health care through the exploration and incorporation of complementary therapy modalities that demonstrate positive client outcomes (Barnes, Powell-Griner, McFann, & Nahin, 2004; Kreitzer, Mitten, Harris, & Shandeling, 2002; Nahin & Straus, 2001). Manual lymphatic drainage therapy, which focuses on treating the lymphatic system, is one such modality to consider. This therapy originated in Europe and has slowly made its way to the United States. It is referred to by various abbreviations such as MLD (manual lymph drainage), LDT (lymph drainage therapy), and MLT (manual lymph therapy), depending on the specific lymphatic technique that is employed. A multifaceted treatment program that incorporates the principles of compression, exercise, skin care, and preventative measures may also be added to the basic therapy in certain situations such as in the treatment of lymphedema. This program is referred to by various abbreviations such as CDP (complex decongestive physiotherapy), CPDT (complex physical decongestive therapy), CLT (complex lymphatic therapy), CDT (combined decongestive therapy) and will be discussed later. In this article, MLDT and CDP will be utilized for simplicity. These therapies may be provided in various settings such as private offices or clinics. There are various training programs available for MLDT and for those wishing to become certified lymphedema therapists. Although techniques may vary, the programs share the same expected client outcomes.

MLDT consists of specific hand positions and movements, which stimulate the lymphatic system as well as assist in redirecting and enhancing the lymphatic flow. Some practitioners attend programs where they receive specific training in manual lymphatic mapping (MLM). This is a hands-on method utilized to manually assess the specific rhythm, pressure, direction, and quality of lymphatic flow. This technique is helpful in identifying restrictions in flow as well as alternate lymphatic pathways that have been established by the body (Chikly, 2001).

Because the majority of the lymphatic system is superficial, a very light touch is utilized in providing the therapy. At times, however, varying degrees of hand pressure may be indicated. MLDT is sometimes

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referred to as massage, however this can be misleading as one generally equates massage with a heavier touch. The therapy is individualized and follows specific therapy sequences/protocols. Practitioners incorporate information from the client's medical history as well as from a physical exam to develop a treatment plan. Clients may be referred for therapy by another health care provider or may seek the therapy independently. Information concerning the lymphatic system, the therapy, and plan of care are shared with the client during the evaluation as well as during subsequent treatment sessions.

To prepare for the therapy, clients are encouraged to drink plenty of water a few days prior to the session as well as to eat lightly on the first day of their therapy. MLDT is generally provided with the client in a reclined position on a treatment table. Positioning may vary depending on specific treatment protocol as well as the body area to be treated. If the removal of clothing is necessary, the practitioner is attentive to ensuring privacy, warmth, and comfort.

Congestion of the lymphatic system may occur as a result of many factors. The following are some examples: illness; surgery; lack of exercise; bumps, bruises, and other injuries; exposure to heavy metals and toxins; tight-fitting clothing; impaired circulation; food allergies and sensitivities; and stress.

Stimulating the lymphatic system provides many beneficial effects and at the same time serves as a valuable tool in preventative health maintenance. The following outcomes have been identified:

- stimulation of the immune system by increasing the lymphatic flow in the lymph nodes
- enhancement in the movement of body fluids thereby increasing the ability to reduce edema
- increasing the elimination of wastes from the tissues
- indirect stimulation of the circulation of the body
- promotion of a sympathicolytic action where there is a decrease in sympathetic response
- increase in parasympathetic response with a resultant calming effect
- reduction in muscle spasm and pain (Chikly, 2001).

Although the lymphatic system was identified in the 17th century in Europe, the health care profession remains in the early stages of understanding the role and the impact that the system has on the human body. As a result, the lymphatic system, an extensive body system, can be neglected during the assessment, planning, and intervention stages of providing client care. Thiadens (1998) stated that "Lymphology is essentially an overlooked field in medical schools in the United States, and, because of this and other important factors, medical professionals have been exposed inadequately to this poor step child of U.S. medicine" (p. 2864). In recent years, advanced medical technology has allowed for improved visualization of the lymphatic system and has therefore encouraged a more expansive study into the structure, function, and treatment of the system.

Sample of Indications for Manual Lymphatic Drainage Therapy

- Lymphostatic edema
- Lymphodynamic edema
- Chronic venous insufficiency
- Burn/surgery scars
- Pre- and postoperative
- Wound healing
- Fractures
- RSDS (Reflex Sympathetic Dystrophy Syndrome)
- Inflammatory joint disease
- Skin complexion/wrinkles
- Chronic infections
- Stress
- Chronic headache
- Migraine
- Chronic pain
- Fibromyalgia
- Chronic Fatigue Syndrome
- Pregnancy stretch marks
- Tissue detoxification

Health care providers are becoming more aware that MLDT is part of the primary treatment for lymphedema, however, the therapy can have a positive effect on many other conditions as well as play a major role in preventative health. Multiple indications for MLDT have been identified in the literature. These indications have been observed mainly in clinical practice, and unfortunately at the present time, many of them lack supportive scientific documentation (Chikly, 2001; Foldi, Foldi, & Kubil, 2003; Kasseroller, 1998). The box titled "Sample of Indications for Manual Lymph Drainage Therapy" includes a very abbreviated list of those indications.

REVIEW OF FUNCTION, ANATOMY, AND PHYSIOLOGY

To appreciate the complexity of the lymphatic system as well as understand how MLDT can be a valuable treatment modality; a review of the function, anatomy, and physiology of the lymphatic system is in order. It should be understood that the information presented

here is a brief overview. The knowledge base required for MLDT practitioners is extensive. Those practitioners maintaining lymphedema certification have received further in-depth information and training.

The lymphatic system is essentially a one-way path from the interstitial tissues back to the circulatory system. The primary functions of the system are (a) to defend the body against infection and disease by producing, maintaining, and distributing lymphocytes; (b) to facilitate the movement of excess interstitial fluid from the tissues back into the blood, thereby assisting in the maintenance of normal blood volume and preventing the development of edema; and (c) to transport substances such as nutrients, hormones, lipids, and waste products from their tissues of origin to the venous side of the circulatory system (Martini, 2001).

The lymphatic system consists of lymphatic vessels, lymph fluid, and lymphoid tissues and organs, however it is necessary to include some basic information about capillary exchange, as this is the process by which the lymphatic system begins to collect lymph fluid.

Capillary Exchange

Homeostasis in body fluids is maintained as a result of a fine balance between hydrostatic pressure and osmotic pressure in the blood capillary and in the interstitium. The processes of diffusion, osmosis, filtration, and reabsorption play major roles in this fluid regulation. The manner in which these pressures and processes work together is very complex. In general, as blood flows through the blood capillaries, water and solutes move across the arteriole side of the capillary wall into the tissues as a result of the pressure of fluids against the vessel wall (blood hydrostatic pressure). The majority of this material is reabsorbed on the venule side of the capillary. Each day, however, approximately 3.6 liters of the water and solutes that have moved into the interstitial tissue enter into the lymphatic system (Martini, 2001). Proteins also leak into the tissues from the capillaries and are then returned to the circulatory system via the lymphatic system. If proteins are unable to return because of an impaired lymphatic system, these proteins attract water molecules, which results in the accumulation of fluids in the interstitial tissues (refer to Figure 1 and 2).

To provide the most effective and appropriate treatment, it is essential that the MLDT practitioner have an in-depth understanding about the specific pressures and processes that assist in regulating fluid balance. For example, when treating an impaired lymphatic system, the removal of protein molecules in the tissue is a major goal. To enhance the removal of these protein molecules from the tissues, specific manual techniques and types of external pressure are utilized to maintain therapeutic levels of hydrostatic pressure. Inappropriate application of pressure could result in removing water from the tissues without the desired protein removal. Water molecules, attracted by the remaining protein molecules, will return to the tissues thus increasing the undesired edematous state.

FIGURE 1
Components of the Lymphatic System

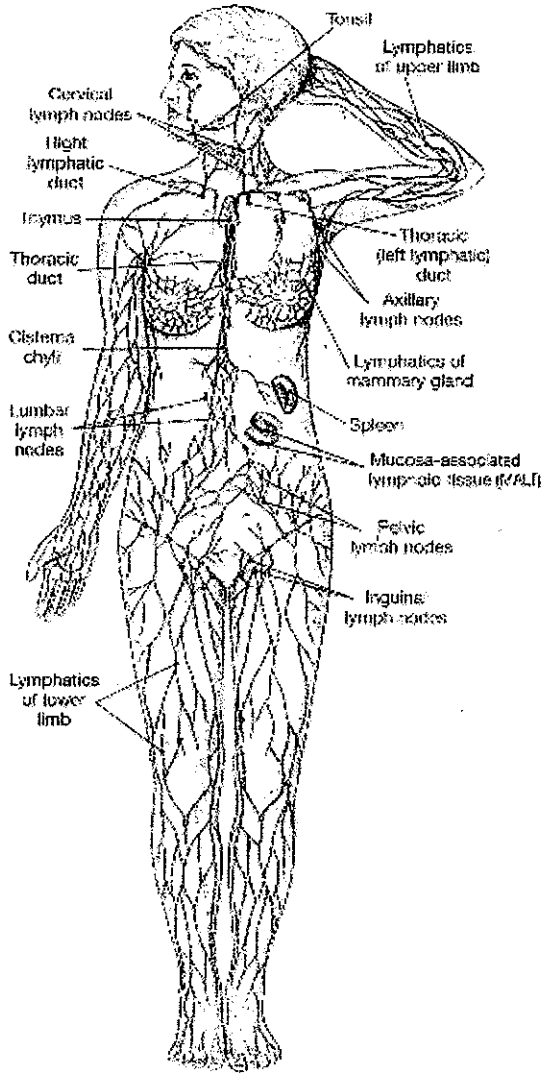
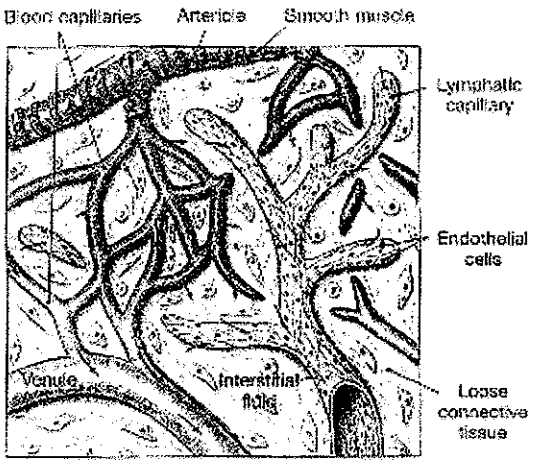
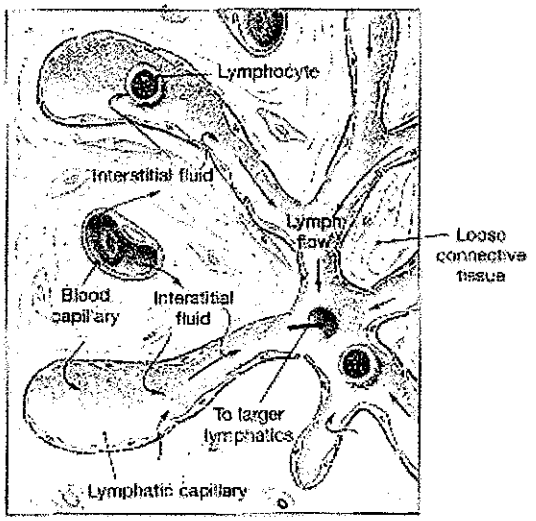


FIGURE 2
(a) View of the Association of the Blood Capillaries and Lymphatic Capillaries (Arrows show the direction of lymph, blood, and interstitial movement).
(b) Sectional View of Lymphatic Capillaries.



(a) Association of blood capillaries, tissue, and lymphatic capillaries



(b) Sectional view

Vessels

The lymphatic vessels transport lymph fluid from the interstitial tissues to the venous circulatory system. The smallest of the vessels are feather-like at their origin and are called lymphatic capillaries or initial lymphatics (Casley-Smith, 1980). These lymphatic capillaries, lined with overlapping endothelial cells that act as one-way valves, allow for the entry of fluids and solutes into the lymphatic capillary and prevent their return to the intercellular spaces. The lymphatic capillaries are located on a superficial as well as deeper level in almost every tissue and organ in the body. The vessels are held in place within the interstitial tissue by structures called anchoring filaments that gradually increase in size and are called precollectors and collectors, respectively. These collectors have one-way valves in their channels that help prevent back-flow and assist in moving the lymph fluid. The vessel segments between each valve are muscle units referred to as lymphangions. Rhythmic contractions of these muscle units are spontaneous and are central to facilitating the lymph flow. The contractions are influenced by an increase in vessel-wall tension when the lymph vessel has reached its maximum volume. The pulsation of the arteries, contractions of adjacent muscles, and changes in intrathoracic pressure as a result of deep breathing assist in enhancing the lymphatic flow as well. Sympathetic, parasympathetic, and sensory nerve fibers located in the lymph vessels, and nodes can also affect the contraction of the vessels (Hukkanen, Konttinen, Terenghi, & Polak, 1992). The rate of these contractions at rest is approximately 6 to 10 per minute, however the rate can increase to up to 20 per minute in stressful situations (Weissleder & Schuchhardt, 2001).

The thoracic duct is the largest lymphatic vessel in the body. It originates inferior to the diaphragm approximately at the level of L_1-L_2 vertebrae. A saclike chamber called the cisterna chyli is located at the base of this duct. The thoracic duct carries lymph fluid from the lower body inferior to the diaphragm and the left side of the body superior to the diaphragm. This duct empties lymph fluid into the circulatory system at the junction of the left subclavian and left jugular vein. Approximately 1.5 to 3.5 liters of lymph circulate through the thoracic duct in a 24-hour period (Chikly, 2001; Foldi et al., 2003). The lymph fluid from the right side of the body superior to the diaphragm is carried toward the right thoracic duct. The right thoracic duct empties lymph fluid into the circulatory system at a junction between the right subclavian vein and the right jugular vein.

Lymph Fluid

When interstitial fluid enters the initial lymph capillaries, it is called lymph. Lymph consists primarily of water (96%), proteins, lipids, hormones, cells, toxins, and cellular debris from the tissue of origin. Other sub-

stances such as hormones, enzymes, glucose, histamines, cytokines, and hyaluronic acid may also be present in lymph (Chikly, 2001). The color and composition of lymph varies and is dependent on the tissue where the fluid originates. Lymph is usually clear or yellowish in color and slightly less viscous than blood. If the lymph originates in the intestinal tract the fluid may be milky white and highly viscous because of the absorbed fats from digestion. Lymph resembles plasma, however, under normal conditions it contains a lower concentration of protein. The lymphatic system plays a major role in recirculating the proteins that have leaked into the interstitial tissues from the blood circulation. Approximately 75 to 100 grams of protein can leak into the interstitial tissues in a 24-hour period (Chikly, 2001). The blood capillary experiences difficulty in reabsorbing these proteins because of the size of the molecules, and the body is therefore dependent on the lymphatic system for the recovery and return of the proteins to the blood circulation. In cases where the lymphatic system is unable to keep up with the fluid load, the lymph becomes more protein rich and can lead to clinical problems: "This removal of proteins from the interstitial spaces is an essential function, without which we would die in about 24 hours" (Guyton & Hall, 1996).

Lymphoid Tissues and Organs

Lymphoid tissues are concentrated with lymphocytes. These tissues include the tonsils and connective tissue nodules that are located in specific areas deep in the epithelial linings of the body. Lymphoid organs include the spleen, thymus, and the lymph nodes. Lymph nodes are small, oval, bean-shaped organs that are situated in strategic locations throughout the body. The nodes are arranged in groups or chains and vary in size with some as small as a pinhead and the largest about the size of an almond. There can be as many as 600 to 700 nodes in the human body. The primary function of the lymph nodes is to filter, purify, and concentrate the lymph before it is returned to the venous circulation. The venous system within the node absorbs approximately 50% of the liquid content of the lymph (Weissleder & Schuchhardt, 2001). Foreign particles are trapped in the lymph nodes and phagocytized by macrophages thus preventing them from being disseminated throughout the body. Lymph nodes also play a major role in the immune response. "As lymph flows through a lymph node, at least 99 percent of the antigens in the lymph are removed" (Martini, 2001, p. 760). In response to these antigens, lymphocyte activity is stimulated.

INDICATIONS AND BENEFITS

After a basic review of the lymphatic system, it is easier to understand how MLDT can be of benefit to the body. As stated earlier, there are multiple conditions that can benefit from the therapy. Only a few select conditions are identified in this article.

Edema

Edema may be the most common indication for LDT. It must be noted, however, that MLDT is not indicated for all types of edema. MLDT practitioners must be attentive to assessing the medical diagnosis, history, and appropriateness for the therapy. The study of edema is very complex, and it is important to understand that edema is a symptom, not a disease. Edema can basically be defined as an excessive accumulation of interstitial fluid in the body, however there are different processes by which this can occur. The symptom of edema can occur when the lymphatic system is abnormal as well as when it is normal. For example, lymphodynamic edema is an edema that occurs in a normal lymphatic system when it just becomes overburdened by the amount of fluid that it has to carry. Generally the system can handle 10 to 20 times the usual flow, however, beyond this point, insufficient functioning results, and edema occurs. This type of edema may manifest locally or as general body edema and occurs when there is a disruption in the physiological fluid balance without the compensatory change necessary to assist in fluid regulation. There are many diseases or conditions that can lead to the development of this type of edema. Understanding the etiology of the edema is crucial for the delivery of appropriate therapy. A few basic examples of edematous conditions where MLDT has demonstrated positive outcomes are postfracture/sprain, hematoma, presurgery and postsurgery, burns, chronic venous insufficiency, RSDS, various rheumatologic conditions, chronic inflammation, local allergies, insect bites, swollen breasts, skin ulcers, and chronic skin conditions (Chikly, 2001; Kasseroller, 1998).

Lymphedema is a specific type of lymphostatic edema that occurs when the lymphatic system is not normal. The inability of the lymphatic system to manage the amount of lymph fluid present in the body (reduced transport capacity) results in an accumulation

of protein, water, and cellular metabolites in the tissues of an extremity or body part thus leading to edema. The identifying characteristic is the high content of protein in the interstitial tissues. This is a chronic condition without a known cure. Lymphedema may also be accompanied by a lymphodynamic edema. When a combination of edemas is present, individualized treatment is required for each type of edema.

Diuretics may be indicated in the treatment of mixed edema, however, they offer minimal improvement in true lymphedema. The initial fluid may be removed; however, protein molecules that are unable to return via the lymphatic system remain in the tissues and thus attract more fluid. The use of diuretics can cause complications by mobilizing fluids from other areas of the body thereby leading to hypotension and electrolyte disturbances (Farncombe, Danuels, & Cross, 1994).

The accumulation of protein that occurs in lymphedema creates an ideal environment for the growth of pathogens, thereby increasing the risk for infection. Recurrent attacks of cellulitis can lead to further damage to the lymphatics, impair the quality of the skin, and aggravate the edema. Proteins act as foreign bodies and cause a chronic inflammatory response in all of the affected tissues, thus leading to the development of subcutaneous fibrosis (Rockson, 2001).

The etiology of lymphedema is basically classified as primary and secondary lymphedema. Primary lymphedema is characterized by lymphatic vessels or nodes that are either undeveloped (aplastic), underdeveloped (hypoplastic), or too large and incompetent (hyperplastic). Primary lymphedema is thought to be either congenital or hereditary and may occur at birth, at the onset of puberty, or after age 35. Approximately 70% to 90% of those diagnosed with primary lymphedema are women (Chikly, 2001).

The etiology of secondary lymphedema is a known insult to the lymphatic system. Lymph capillaries, vessels, and/or nodes have either been damaged, removed, occluded, or fibrosed and are unable to manage the lymphatic fluid load that has accumulated in an involved area. Some of the common etiologies of secondary lymphedema are surgery, biopsy, dissection, benign or malignant tumor growth, radiation therapy, infection, trauma, chronic venous insufficiency, filariasis (parasite), and artificially/self-induced. It has been reported that the symptoms of lymphedema may occur within days to years postsurgical procedure (Farncombe et al., 1994).

There is an increase in the number of persons who suffer from lymphedema. This is due, in part, to our rising population who are elderly. With the aging process, there is a decrease in the force of the lymphatic pump. At the same time, normal processes in the body that influence the lymphatic flow are impaired by conditions such as heart failure, metabolism diseases, and joint diseases. The progress that has been made in malignancy treatments has led to increased remission and cure, however the side effects of these treatments may cause lymphedema (Foldi, 1998; Hinrichs et al., 2004; Ozaslan & Kuru, 2004; Ryan et al., 2003; Rymal, 2003).

In the very early stages, lymphedema may not be readily detected. It may take months or years before signs and symptoms are clinically evident. The actual onset of signs and symptoms may be triggered by specific events such as infection (local or general), injury to the skin and tissues (burns, hot weather, insect bites, scratches), or muscle exertion (lifting heavy objects, etc.). The effect of lowered cabin pressure during airplane flight has also been reported to contribute to the onset of signs and symptoms of lymphedema (Casley-Smith & Casley-Smith, 1996). Clients present with various signs and symptoms such as discomfort, heaviness, tightness, numbness, tingling, swelling, decreased mobility, infection, and pain in the affected body part. Swelling may begin as a soft, pitting type, may be intermittent, and may disappear when the body part is elevated. Some of these signs and symptoms can easily be attributed to other conditions. As the condition progresses, the swelling becomes nonpitting, with skin thickening and fibrosis formation. This leads to further disruption in the lymphatic system.

The diagnosis of lymphedema is generally derived from the client history and clinical examination that involve visual inspection and palpation. Measurements of the affected body part can assist in the diagnosis. Some examples of diagnostic tests that physicians may also utilize are computerized tomography (CT), magnetic resonance imaging (MRI), duplex ultrasound scan, and nuclear medical imaging. Other more extensive diagnostic testing may be indicated in certain circumstances (Farncombe et al., 1994; Weissleder & Schuchhardt, 2001).

The main complications of lymphedema are infection and cancer. Infection may present as recurrent cellulitis (inflammation/infection of the subcutaneous tissue), erysipelas (surface cellulitis of the skin caused

by streptococcus), lymphangitis (inflammation/infection of a lymphatic vessel), or general septicemia (infection in the blood system). Lymphangiosarcoma, also referred to as Stewart-Treves syndrome, is a rare malignant tumor of the vascular endothelium.

Lymphedema is a complex chronic condition that requires early treatment and long-term management. The complex treatment program, CDP, is the recommended treatment for lymphedema. Treatment involves comprehensive care provided by knowledgeable and skilled therapists. Collaboration with various health care professionals assists in the provision of optimal care. Although basic steps of CDP were described at the end of the 19th century in Europe, treatment of lymphedema has only become widely accepted during the past 25 years. In time, the therapy has been developed and augmented by several practitioners. Practitioners maintaining lymphedema certification have received specialized and extensive training. They can provide therapy in an office, clinic, or home care setting. There are various training programs available for those who wish to provide lymphedema care.

The overall goal of CDP is to increase the transport capacity of the lymph collectors, enhance reabsorption of proteins, maintain skin integrity, prevent reaccumulation of edema, and decrease fibrosis. All clients are assessed carefully, and the program is individualized to their specific needs. Any precautions and contraindications to the therapy are discussed with the client and the referring physician. The phases of the program incorporate MLDT, specialized lymphedema bandaging, specific exercises, meticulous skin care, and fitted compression garments. Some clients may not require intensive bandaging if the edema is very mild and responds to MLDT effectively. Client education is very comprehensive during CDP with emphasis on self-care and preventative measures. The success of the program relies heavily on client compliance, and psychosocial support plays an integral role in the therapy.

Lymphedema bandaging is a highly specialized technique that utilizes specific short stretch bandages, padding, and foam. This technique assists the lymphatic vessels to empty and reduces the hydrostatic pressure gradient from the blood to the tissues. This action prevents the refilling of the interstitial tissues with fluid and facilitates protein reabsorption. Softening of fibrotic tissue is enhanced through the use of specific foam and pressure applications. Bandages are applied in a very specific manner and left in place for 23 hours per day during the treatment phase. Clients are instructed to perform specific exercises while bandaged as this aids decongestion of the tissues. The bandages also provide support for tissues that have lost elasticity. When the affected limb has reached normal or near normal size, the client is fitted with an elastic compression garment specifically designed for lymphedema management. The garment is worn during the day to continue enhancing the above processes. The garment must be fitted properly and replaced every 6 months or sooner if necessary, as the elasticity is reduced in time and with wear and laundering. Some clients are required to utilize a type of compression at night.

Timeframes and schedules for treatment vary and are determined by the severity of lymphedema and the response to therapy as well as reimbursement issues. In the United States, for example, treatment requiring daily compression bandaging may be limited to an average of 3 to 4 weeks for an upper extremity and 4 to 6 weeks for a lower extremity. Some clients require more extensive therapy. Progress is often slow and may be complicated by other physiological conditions. Because the condition is chronic, long-term after care and follow-up is essential.

Other treatments for lymphedema are under investigation. Surgical procedures have been developed that consist of grafting and transplantation. Although these procedures have demonstrated positive outcomes in the treatment of lymphedema, the study groups have been small in size. Pneumatic compression pumps have been utilized for many years. They remain under investigation, however, as the therapeutic results vary, and significant side effects may occur. For example, the pump may remove water from the tissues, for the most part, and leave behind the problematic protein. There is also the possibility of damaging the residual healthy lymph vessels. It is recommended that the pumps be utilized in conjunction with manual therapy (Weissleder & Schuchhardt, 2001).

Given the increasing number of lymphedema cases that are being diagnosed, continued awareness and research concerning lymphedema and its treatment are imperative. It is of concern to read the following statement that was reported in the September/October issue of *CA-Cancer Journal for Clinicians*: "A comprehensive computerized search of the worldwide medical literature on the incidence of lymphedema related to breast cancer treatment yielded 35 reports since 1970"

(Petrek, Pressman, & Smith, 2000, p. 295). Fortunately since 2000, there have been significantly more research studies in the United States that have been dedicated to lymphedema following breast cancer. Lymphedema related to other areas of the body are also beginning to be investigated. It should be noted that lymphedema is a "common" condition that can develop following breast cancer treatment.

Stress

MLDT has been found to be very helpful in reducing stress and tension. Although the light touch provided in a comfortable atmosphere in itself is very relaxing, a significant effect that the therapy has on the body is that it decreases the sympathetic fight-or-flight response and thereby increases the parasympathetic response in the body. "By stimulating the parasympathetic tone, Manual Lymphatic Therapy can cause relaxation, antispastic and antalgic effects" (Chikly, 2001, p. 99-100).

Inflammation and Pain

Swelling, discomfort, and pain characterize the inflammatory response. Because MLDT can assist in reducing edema, mobilizing stagnant fluid, and improving circulation, many conditions involving subacute or chronic inflammation may benefit from the therapy. Providing light stimulation to the skin may also have a pain-inhibiting effect (Chikly, 2001). A few examples of conditions that have responded with positive outcomes to MLDT are sinusitis, bronchitis, laryngitis, arthritis, bursitis, tendonitis, chronic breast pain, Reflex Sympathetic Dystrophy Syndrome (RSDS) also referred to as Chronic Regional Pain syndrome, eczema, and acne (Chikly, 2001; Kasseroller, 1998).

Persons diagnosed with fibromyalgia have been found to present with anxiousness, depression, and disturbed sleep patterns. Their muscles are unable to attain a deeply relaxed state, and as a result, these people are chronically exhausted and stiff. Tension, either physical or emotional, has been found to aggravate chronic pain syndromes as well (Diamond & Conian, 1997).

The relaxation response and pain-inhibiting effect attained with MLDT has been found helpful in treating fibromyalgia, chronic fatigue, and chronic pain syndromes. Conditions such as migraines, headache, neck and lower back pain, and phantom limb pain have also benefited from the therapy (Chikly, 2001; Kasseroller, 1998).

Detoxification

Our bodies are exposed to synthetic and often toxic chemicals on a regular basis. Industrial chemicals and pollutants are found in our water. Pesticides, herbicides, food additives, heavy metals, residues from drugs, anesthetics, and environmental hormones are trapped within the body's tissues in great concentrations. All body systems are affected in a negative manner. There are many symptoms of toxicity but the most common signs are headache, fatigue, aches and pains, mucus problems, digestive problems, allergy symptoms, and sensitivity to environmental agents such as chemicals or perfumes.

By stimulating the lymphatic system, the ability to clear cellular wastes, foreign bodies, dead cells, toxins, and excess fluid from the interstitial tissues is enhanced. The therapy can serve as a method to cleanse the general body, and/or to focus on specific areas. LMDT is indicated preoperatively, before the lymphatic system is inhibited via incision, to drain toxins and stimulate the immune system (Chikly, 2001).

Regeneration of Tissues

As indicated above, MLDT decreases edema, inflammation, and pain as well as assists in clearing the tissues of unwanted substances. The therapy also indirectly increases the blood circulation, thereby enhancing the oxygen and nutrient delivery to the tissues. This increase in blood circulation occurs as a result of dilation of blood capillaries and collateral blood circulation development. All of the above effects are beneficial in promoting the healing process (Chikly, 2001).

The therapy has been shown to be effective in treating postoperative edemas as well as assisting in the reduction of fibrosis and scarring. A few examples of postoperative procedures benefiting from MLDT that have been specifically cited in the literature are oral and/or facial surgery, postvenous vascular surgery, orthopedic surgery, breast surgery, lymph node removal, and amputation. Pregnancy stretch marks may also be reduced or avoided with regular therapy during pregnancy (Chikly, 2001; Kasseroller, 1998).

Some practitioners are specifically trained to utilize the technique of MLM to assess the direction, depth, and restrictions in the lymphatic flow. The early identification of restrictions in flow allows the practitioner to intervene with therapy early before fibrotic tissue and scarring develops (Chikly, 2001).

As mentioned earlier, the major part of the lymphatic circulation lies just under the skin, and MLDT can be very helpful in treating certain dermatological conditions. This was actually one of the first applications for lymphatic drainage in Europe. Estheticians, practitioners who focus on promoting and maintaining healthy skin, often incorporate lymphatic therapy into their practice for cosmetic enhancement. Specific facial techniques assist to improve circulation, reduce swelling, remove toxins, increase tissue regeneration, and may reduce wrinkles.

Immune Stimulation

MLDT may be viewed as a preventative therapy because stimulation of the lymphatic system enhances the body's immune response. Increasing the flow through the lymph nodes promotes the removal of antigens and also promotes the generation and distribution of immunocompetent lymphocytes throughout the body.

Chronic Venous Insufficiency

There is a close connection between the venous and the lymphatic circulatory systems. A decompensation in venous function creates an additional workload on the lymphatics in clearing water and protein. Inflammation of the venous system can also lead to inflammation of the lymphatic vessels (Weissleder & Schuchhardt, 2001). Positive outcomes have been reported in the reduction of edema associated with chronic venous insufficiency and chronic venous ulcers/wounds when treated with MLDT. Fitting clients appropriately with compression stockings also enhances the reduction and maintenance of edema (Clement, 2000; Ibegbuna, Delis, Nicolaides, & Aina, 2003).

CONTRAINDICATIONS TO MANUAL LYMPHATIC THERAPY

LDT is generally a safe therapy, however, it is contraindicated in the following conditions: acute infection/inflammation, major cardiac problems, thrombosis/venous obstruction, hemorrhage, acute enuresis, and malignant tumors (Chikly, 2001; Kasseroller, 1998). There may be relative contraindications to MLDT that the therapist will take into consideration and discuss with the client and referring physician. Careful review of the medical history is essential prior to initiating therapy.

Providing therapy for persons with malignant conditions is a controversial area. Although some studies have reported that MLDT does not increase the spread of cancer cells or accelerate the growth of tumors, there has been limited research done in this area. Collaboration with the primary physician is essential. In certain situations, the therapy may be indicated for pain management, edema control, as well as to promote a better quality of life. Some medical offices/clinics, however, are incorporating MLDT into the treatment plan as soon as possible (Chikly, 2001).

Providing comprehensive, effective, and quality care while containing cost is essential in our current changing health care system. MLDT can clearly play an important role in complementing standard medical and physical therapies, thereby escalating the healing processes, decreasing painful mobilization, as well as assisting in the prevention of complications.

Time frames and frequency for MLDT sessions are individually assessed and are dependent on the specific indication for therapy as well as client response. The duration of a session varies and may range from 30 minutes to 120 minutes. The frequency may begin at 1 to 2 times per week and taper off as progress is achieved. Persons interested in a general preventative health session may seek therapy 3 to 4 times per year. Specific treatment for lymphedema involves more extensive timeframes and may require 4 to 8 weeks of daily therapy. Here again, the timeframes and frequency are assessed on an individual basis.

The cost of the sessions will vary. Generally, the cost may be $50.00 per hour and higher.

QUALIFICATIONS OF PRACTITIONERS

Various health care professionals incorporate lymphatic therapy into their practice, and therapists vary in experience, expertise, and skill. There are many organizations that offer educational training courses in manual therapy, and these courses vary in length, intensity, and style of application. Not all MLDT practitioners choose to obtain the intensive training required for lymphedema care. Those who do choose to work with lymphedema are required to attend intensive educational programs. Each lymphedema training program provides a certification of attendance and completion of the specific course work. Currently, there are no government-recognized national standards for the treatment of lymphedema or accreditation of lymphedema courses. In 2001, the Lymphology Asso-

ciation of North America (LANA) and the National Lymphedema Network (NLN) adopted specific standards for training programs, treatment centers, and therapists in the United States, and a national standardized certification exam was also developed. Many competent lymphedema practitioners have not yet taken this national exam.

Choosing a practitioner involves asking questions about training, background, and services to be provided. Questions concerning fees and verification of insurance coverage should be discussed prior to initiating therapy, as MLDT therapy may not always be covered by insurance.

Locating a Practitioner

MLDT practitioners can be found via local resource directories such as the telephone directory, or via the Internet. Various Web sites at the end of this article can assist in locating practitioners.

CASE STUDIES WITH MEASURABLE OUTCOME CRITERIA

Case Study #1

KC, a 77-year-old woman, was referred for the evaluation of peripheral edema. Past medical history included hypertension, glaucoma, venous insufficiency, and phlebitis of the left lower extremity. KC presented with bilateral lower-limb pitting edema. Varicosities were present with skin hemosiderin staining at both ankles. She stated that she had experienced multiple injuries to her right ankle and left knee and has had chronic swelling in her ankles for years. Left knee swelling began after a recent injury because of a motor vehicle accident. Recommendation was made to discontinue wearing panty girdles as this was contributing to the impairment of venous return from her lower extremities. She was also advised to increase her water intake. Measurements were recorded at 4-cm. increments at the beginning of each treatment. Refer to Table 1 for a general summary of initial and final measurements. She was scheduled for MLDT once per week × 2 treatments, and then approximately every other week × 4 treatments with therapy concentration to both lower limbs. KC was fitted with compression stockings after her 4th session. Visible decrease in discoloration of the ankle area was noted. KC was instructed in self-care promotion practices such as exercise and diet during her treatment sessions. She reported that the ankle and knee swelling varies depending on activity and humidity, however, for the most part decreasing the edema has decreased her discomfort and increased her quality of life.

Table 1
Case Study #1 Pretherapy and Posttherapy Measurements (data in centimeters)

	Right Lower Extremity		*Left Lower Extremity*	
Reference Point	*6/18/03*	*8/28/03*	*6/18/03*	*8/28/03*
Point zero	24.6	23.4	26.4	25.9
4	21.9	21.0	24.2	23.7
8	23.7	22.0	25.6	24.0
16	30.5	27.5	32.8	30.0
24	33.7	32.7	35.8	34.8
32	36.2	33.2	39.1	35.0
40	38.8	37.3	40.9	39.5
48	44.8	41.5	43.9	42.5

Table 2
Case Study #2 Pretherapy and Posttherapy Measurements

	Affected Right Lower Extremity		*Left Lower Extremity*
Reference Point	*8/7/03*	*9/3/03*	*8/7/03*
Point zero	25.5	23.8	23.8
4	22.0	20.0	19.6
8	21.0	19.9	20.3
12	21.9	21.5	21.6
16	26.8	25.2	25.0
20	30.2	28.5	28.5
24	32.2	31.4	31.0
28	34.0	32.9	33.5
32	33.2	32.0	33.6
36	32.9	32.2	33.0

Case Study #2

TD was diagnosed with fractured ankle in three places. Cast was placed for 8 weeks. On cast removal, TD was fitted with a brace and was instructed to use a cane for support. The attending physician did not recommend physical therapy. TD continued to experience edema and decreased range of motion for 3 weeks postcast removal. She was referred for evaluation for MLDT by her chiropracter. TD complained of skin sen-

Table 3
Case Study #3 Pretherapy and Posttherapy Measurements (Data in centimeters)

Reference Point	*Pretherapy 5/28/03 Nonaffected Arm (Left)*	*Pretherapy 5/28/03 Affected Arm (Right)*	*Posttherapy 6/9/03 Affected Arm (Right)*
Wrist @ 4cm	20.3	21.5	20.7
Forearm @ 16cm	26.5	29.0	27.7
Upper arm @ 32cm	38.6	39.9	37.7
Hand	19.3	22.4	19.8
Thumb	6.0	7.0	6.4
Index finger	6.7	6.9	6.5
Middle finger	6.8	7.0	6.8
Ring finger	6.2	6.4	6.1
Small finger	5.0	5.3	5.2

Table 4
Case Study #4 Pretherapy and Posttherapy Measurements (Data in centimeters)

Reference Point	*Pretherapy 4/21/03 Nonaffected Arm (Right) (Right Hand Dominant)*	*Pretherapy 4/21/03 Affected Arm (Left)*	*Posttherapy 6/5/03 Affected Arm (Left)*
Wrist @ 4cm	19.0	19.6	18.7
Forearm @ 16cm	26.5	26.5	25.9
Upper arm @40	35.0	34.5	34.2
Thumb	7.5 (right dominant)	7.6	7.0
Index finger	7.1	7.5	6.9
Middle finger	7.1	7.2	6.5
Ring finger	6.2	6.7	5.7
Small finger	6.0	5.9	5.5

sitivity, edema, deceased range of motion, moderate pain with ambulation, and the inability to wear her regular shoes. She was only able to wear loosely tied lace-up sneakers. Lower leg measurements were recorded at 4-cm. increments. Refer to Table 2 for initial and final measurements. TD received treatments once per week × 4 and the final treatment 2 weeks later. There was a decrease in edema noted after the first treatment. TD stated that after the second treatment, she could visualize as well as feel a difference in her foot, ankle, and lower leg. During the third treatment session TD reported that there was increased range of motion in the ankle, decreased skin sensitivity, and decreased pain. By the fourth treatment session, TD was able to wear regular shoes, reported continual improvement, and did not feel the need to use the cane for ambulation. At the 5th treatment session, TD reported that skin sensation was equal bilaterally, range of motion was more improved, and pain level was minimal with some soreness. She was discharged from therapy.

Case Study #3

RP is a 54-year-old woman, post–breast cancer, right lumpectomy with axillary node dissection.

She received chemotherapy and radiation postoperatively. One year after surgery, RP traveled via airplane to the West Coast to visit family. It was there that she and her sister discovered right arm and hand "swelling." On returning home, RP was diagnosed with lymphedema and was referred for therapy. Unfortunately she did not participate in any therapy at that time. She was, however, fitted with a compression

glove and sleeve. Four years after the initial symptoms appeared, RP entered into a lymphedema treatment program. She presented complaining of pain, heaviness, tightness, and edema in her right hand and arm. Arm measurements were recorded at 4-cm. increments, and limb volumes were calculated. The hand was also measured. MLDT/CDP with intensive lymphedema bandaging was indicated. Thirteen treatments during a 2-week period were required for maximum limb volume reduction. During the last treatment session, RP reported that she no longer experienced the discomfort, heaviness, or tightness in the arm and hand. Measurements posttherapy demonstrated a significant decrease in circumference of the hand and arm. These areas were the primary sites of symptomatic edema. Calculated volume reduction specific to RP's arm was 210 milliliters. Refer to Table 3 for an abbreviated summary of measurements. She was fitted with a compression glove and sleeve. Comprehensive education was incorporated regarding specific exercises, skin care, preventative measures, and self-therapy during treatment sessions.

Case Study #4

MC is a 47-year-old woman, post–breast cancer surgery-bilateral mastectomy with right axillary node dissection. She received chemotherapy postoperatively. MC was referred for therapy with the diagnosis of lymphedema involving her right hand and arm. MC complained of swelling and soreness of her left hand and forearm that began after physical exertion. Specific measurements were obtained at 4-cm. increments to calculate and compare limb volume.

MC's lymphedema was a very mild. She received seven MLDT treatments. Intensive bandaging therapy was not indicated in this case. After maximum progress had been achieved in limb volume reduction, MC reported that she was not experiencing the discomfort and heaviness that she had felt prior to therapy. Posttherapy measurements demonstrated a significant decrease in circumference of the hand and fingers. These areas were the primary sites of symptomatic edema. Overall improvement was also noted in the left arm, wrist to upper arm. Calculated volume reduction specific to MC's arm was approximately 100 milliliters. Refer to Table 4 for an abbreviated summary of measurements. MC was fitted with a compression glove and sleeve. Comprehensive education was incorporated regarding specific exercises, skin care, preventative measures and self-therapy during treatment sessions.

APPENDIX
Resources for Locating Manual Lymph Drainage Practitioners

The American Cancer Society: www.cancer.org

British Lymphology Association: www.lymphoedema.org/bls

International Society of Lymphology: www.u.arizona.edu/~witte/ISL.htm

International Association of Healthcare Practitioners: www.iahp.com
This site assists in the location of practitioners.

Lymphology Association of North America: www.clt-lana.org

National Alliance of Breast Cancer Organizations: www.nabco.org

National Lymphedema Network (NLN): www.lymphnet.org/
This site provides a listing of available lymphedema therapist training programs with contact information. Access the individual program Web site address to obtain a complete listing and location of lymphedema practitioners who have attended their programs.

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