

# Lymphascial kinesiology taping for peripheral arterial disease and chronic venous insufficiency

The degenerative cycle of recurrent leg ulcers is extremely costly to the NHS. Contradictory guidelines have fostered a risk adverse culture, which delays timely management and allows deterioration. Effective treatment of leg ulcers has also been hindered due to ignorance about their pathophysiology. Once deemed solely due to arterial/venous insufficiency, then arterial/venous and lymphatic in origin, the role of the myofascial system in interstitial stasis, ulcer formation and wound healing has never been discussed.

Lymphascial Kinesiology Taping (LKT) offers a low-risk, cost-effective intervention, which can improve outcomes at any stage of degeneration or frailty. The concepts of a myofascial interstitium, bio-tensegrity, proprioception and mechano-transduction are considered, in relation to the mechanism of action of LKT on the skin, and how it influences and improves interstitial stasis and tissue necrosis.

Due to a paucity of literature for venous and arterial leg ulcers, presented case studies reveal how deoxygenated tissue necrosis is avoided in traumatic injury, oncology and post-surgical settings to illustrate the theory and promote the use of LKT for tissue health and wound recovery.

The treatment of peripheral arterial disease (PAD) and Chronic Venous Insufficiency (CVI) is not straightforward. Contradictory guidance on calculating the severity of arterial disease and safe provision of compression therapy (Adriennson et al, 2017), has led to uncertainty, where, through fear of doing harm, patients are referred for vascular assessment, rather than being treated (Elwell and Sneddon, 2019). Delays in preventative management lead to deterioration and leg ulceration (Atkin et al, 2021). These often require long-term wound management (Stanton, 2023), as 80% of ulcers recur within 3 months of healing, instigating a repetitive cycle (Probst et al, 2023); costing the NHS £8.3 billion per annum (Guest et al, 2020).

A mitigating factor in the inefficient treatment of recurrent leg ulcers is that they were once viewed as a venous pathology; more recently they were recognised as due to both venous and lymphatic insufficiency (Moffat et al, 2019). However, the picture is still incomplete, as the myofascial system and its role in wound healing has not been considered. Long-term healing can only be achieved by understanding and managing all inter-related body systems, which do not operate independently.

Lymphascial Kinesiology taping (LKT) is an application method for kinesiology tape (KT) that interacts with both myofascial

and lymphatic systems (Anvar, 2016). It is an underestimated tool, which offers a low risk, cost-effective intervention to stimulate the lymphatic/myofascial systems to break the progressive pattern of ulceration and recurrence (Aguilar-Ferrandiz et al, 2013). With few contraindications, LKT delivers 24-hour therapy, without fear of compressing or occluding vasculature; even to exceptionally frail patients, with advanced disease, who are contraindicated for compression. As its mechanism of action is non-compressive, LKT can be used with any ABPI/TBPI reading, at every stage of CVI and PAD degeneration. It does not interfere with any other intervention, and can be used instead of, or in combination with, compression garments, wound dressings and bandages (Sijmonsma, 2010; Pekyavaş et al, 2014).

## Background

### LKT and the myofascial system

The myofascial system comprises muscular and connective tissues (Ganjajei et al, 2020). Historically described as superficial and deep, (the interstitium being the superficial fascia), lately, all connective tissues, including 'liquid fascia', blood and lymph (Bordoni et al, 2018), are viewed as part of an inter-communicating, self-regulating continuum, sending feedback

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#### Key words

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- Venous Insufficiency

and receiving sensory responses to regulate and maintain healthy homeostasis (Bordoni et al, 2019). Bio-tensegrity explains the ability of the body's elastic structures to deform and return to their original state. Changes in stretch and pressure of the skin, muscles and joints are monitored by specialised nerve endings called mechanoreceptors. These receptors send signals to the brain (mechano-transduction) to initiate changes in tension, locally or centrally, called proprioception (Sharkey, 2020; Langevin, 2021)

KT has been specifically designed to mimic the anatomical thickness, weight and retractable stretch of skin and muscles, so that once the tape is applied, it becomes part of sensory feedback to the brain. LKT interacts with different mechanoreceptors to regulate local and systemic blood and lymphatic flow (Illiff and Xu, 2018; Banergee, 2019), reduce oedema (Tsai et al, 2009; Yang, 2023) assist proprioception, reduce pain (Wu et al, 2015), increase muscle strength, improve stability and extend range of motion (Elif et al, 2021).

### **Chronic Venous Insufficiency (CVI)**

From the skin, post-capillary venules drain through perforators, which connect to deep veins located beneath myofascial sheaths of the muscles (Caggiati, 2005; Alamilla-Sanchez et al, 2023). Ninety percent of venous return is controlled by strong muscular pumps in the calf (ankle and thigh) (Williams et al, 2014), whose fascia compresses deep veins to propel blood, against gravity, back to the heart.

Standing, walking and exercise initiates the pumps and one-way valves prevent backflow. With ageing, lasting inactivity or immobility, vein walls lose contractility, distend and become varicose, as valves begin to fail. The subsequent backflow (reflux) elevates venous pressure. Persistent, regressive venous hypertension causes pooling (hypervolaemia), which overwhelms the healthy exchange of blood at the capillary beds, producing stasis. Simultaneously, lymphatic failure occurs (Krizanova et al, 2024; Gray et al, 2016).

### **Updated concepts on microcirculation**

Until revisions of Starlings law (Levick and Michel, 2010), 90% of deoxygenated blood was thought to be drawn back into venous capillaries and returned to the heart, leaving only 10% of cellular detritus to be returned by the lymphatic system. Thus, leg ulceration was considered to be due to vascular insufficiency (Stanton, 2023).

Newer studies revealed that arterial blood is diffused along the length of capillaries and not drawn back into venules, leaving the lymphatic

system responsible for returning 100% of interstitial fluid to the venous system, and maintaining a healthy, free flowing environment at the capillary beds (Mortimer and Rockson, 2014). Consequently, stasis related leg ulcers should also be viewed as due to lymphatic insufficiency (Moffat et al, 2019).

However, as the movement of both fluids in the interstitium/superficial fascia is under myofascial control (Tadeo et al, 2014), leg ulceration should equally be seen as due to myofascial insufficiency.

### **Lymphascial stasis and the pathogenesis of leg ulcers**

Rather than being an innate area, the interstitium, itself, is dynamic and regulates fluid balances, sodium storage and blood pressure by responding to mechanoreceptor feedback (Wiig et al, 2018). The lymphatic system housed within it, acts as the body's sewage plant and intruder defence system by removing cellular waste, whilst identifying and transporting antigens to lymph nodes, where immune responses are initiated to oppose them (Carlson, 2014; McGuire, 2022).

Lymph vessels begin in the capillary beds and form a one-way transportation network back to the venous system at the subclavian veins. Initial lymphatics are single-layer epithelial cells, which overlap to form flaps and act as one-way valves. They are tethered by myofascial anchor filaments to the underside of the epidermis. Fluctuations in interstitial pressure, external forces and deformation of surrounding tissues, allow interstitial fluid to enter the initial lymphatics, where it becomes known as lymph. As interstitial pressures alter, initial lymphatics close and the lymph is propelled forward (Zawieja, 2009).

Free flowing lymph is a product of mechano-transduction (Bordoni et al, 2019); essential, not only for tissue health, but for homeostasis in general. During lymph stasis, the interstitial environment becomes inflamed and stagnant, as waste and antigens accumulate. Mechano-transduction and immune surveillance and transport ceases, leaving the central immune system unaware of the localised inflammation, so no counter-response is generated (Carlson, 2014). Meanwhile, failed capillary exchange and elevated tissue pressure force extravasation of deoxygenated blood cells and lympho-venous oedema into surrounding tissues. Continued immunosuppression and chronic inflammation cause hypoxia, ischemia, fibrotic changes and necrosis (Krizanova et al, 2023; Gray et al, 2016; McGuire, 2022), presenting as varicose eczema, haemosiderin staining, tissue fibrosis,

lipodermatosclerosis, atrophe blanche, skin fragility and ulceration (Spiridon & Corduneanu, 2017). Stasis significantly depletes the ability for wounds to heal once they are formed, which increases the probability of recurrent ulcers (Wounds International, 2013).

### Reducing stasis with LKT

During stasis, inflammation and localised high pressure overloads initial lymphatics, so they cannot drain. As interstitial fluid pressure is the main determinant of initial lymphatic filling and lymph flow (Titze, 2013), and all interstitial fluid can only drain via the lymphatic system (Mortimer & Rockson, 2014), improving lymphascial function is imperative.

LKT improves stasis by dynamically manipulating mechanoreceptors under the skin to facilitate lymphatic drainage, soften fibrosis and reoxygenate tissues (Anvar, 2016). LKT lifts skin to create distance between epidermal and dermal layers (Kafa et al, 2015), which alleviates pressure and enables the myofascial anchor filaments to open and close, initiating drainage. This also lessens nociceptor stimulation to reduce acute and chronic pain (Kase, 2006; Tuckey et al, 2021). Because the pressure beneath the tape is lower than in skin areas without tape, the interstitial fluid is drawn towards the taped area, then into initial lymphatics, where the pressure is lower still (Sijmonsma, 2010). Prolonged pressure fluctuations enable healthy capillary exchange and lymphatic drainage to resume, transforming the deoxygenated, inflammatory environment to a place where effective healing and immune function can recommence (Carlson, 2014).

### The Application of LKT

#### Properties of tape

KT should be medical-grade, 100% cotton with non-latex, elastane fibres, backed with hypoallergenic, heat of skin-activated, acrylic

glue in wave patterns like a fingerprint, to minimise sensitisation and enable skin to breathe and dry easily. It is water-resistant for showering, bathing and swimming (Tunakova et al, 2017) and costs approximately £15 per roll. Once applied, it usually stays in place for 5–7 days but for frail or sensitive skin, tapes stay in place until natural desquamation (shedding) allows them to be easily removed, without tearing or damaging the skin.

#### Contraindications

- Poorly applied tape by untrained clinicians leads to contra-actions and skin reactions/injuries
- open ulcers; but can be used in the periwound area to stimulate circulation and speed up recovery
- broken skin and scabs; but can be used around dermatitis and eczema
- thrombosis; but used for post-thrombotic syndrome
- fever (Sijmonsma, 2010).

#### Principles of Application

KT is stretched to target different tissues [Figure 1]:

- 0–10%: skin/superficial fascia,
- 20–50%: muscular function, and
- 75–100%: ligaments and tendons (Kase, 2013).

Stretched tape is more likely to cause irritation and reactions, so the two ends, or anchors, are never stretched (Jackson et al, 2016). Tape on the roll is pre-stretched to 10–15%, called 'paper off tension' (Artioli & Bertolini, 2014), which many clinicians use. Whilst clinically effective, optimal improvements for lymphascial applications are gained by laying tape on the skin with 0% stretch, whilst the area to be taped is anatomically stretched (Sijmonsma, 2010).

#### LKT for PAD

PAD affects 20% of 55–75-year-olds in the UK

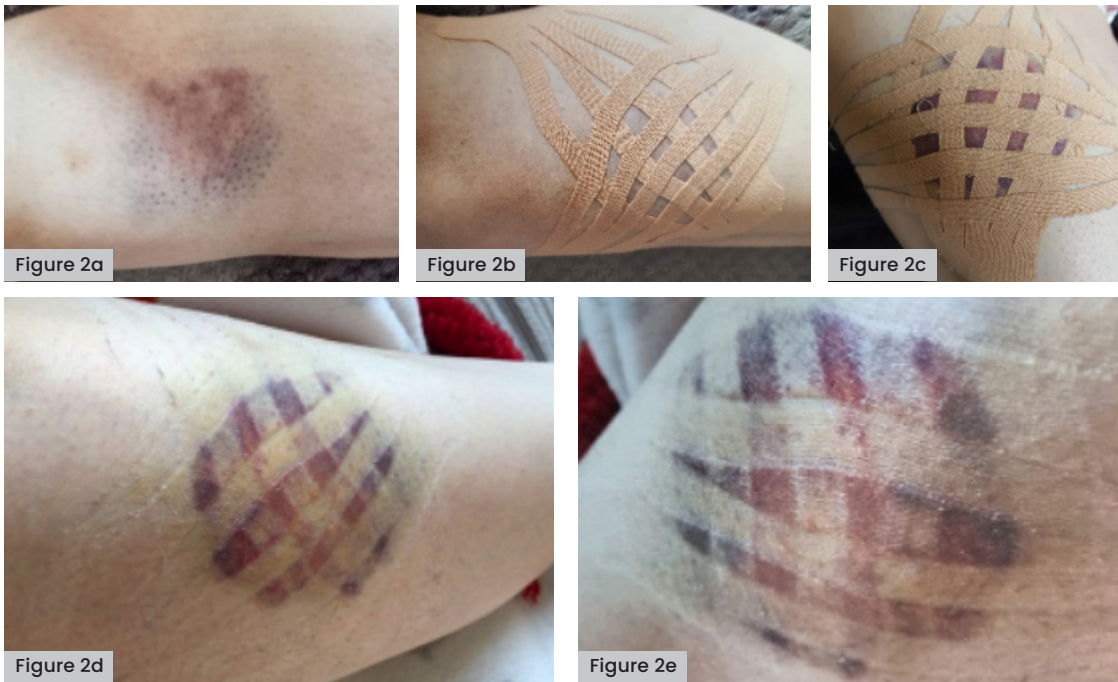


Figure 1a



Figure 1b

Figure 1. a) 0% stretch can be used for fragile skin and for b) varicose vein application.



**Figure 2.** Demonstration of physiological principles on haematoma at a-b) day 1, c) day 3 and d-e) day 6.

(Kyle et al, 2020). It is characterised by the slow, silent build-up of fatty plaques in the arteries that harden and calcify to restrict blood flow. The first sign of PAD is usually pain while walking, which is relieved by resting, called Intermittent Claudication (IC; Cassar, 2006). Exercise, though it seems counterintuitive, significantly improves IC (Rümenapf et al, 2020). LKT supports venous return, enhances muscle pumps (Yam et al, 2019) and stabilises the limb; promoting non-symptomatic movement for exercise (Aguilar-Ferrandiz et al, 2014).

#### LKT for CVI

Tapes can be applied to decrease oedema and direct fluid from areas where it is not draining, towards the nearest lymph nodes or areas which are draining, by beginning applications at the desired drainage end point. Lower limb taping begins at the popliteal nodes, behind the knee, and is laid down the calf and onto the dorsum of the foot (Sobiech et al, 2022), ending near the toes, or on the toes, if cramping pains extend to the toes. A band of tape below the toes finishes the application, to stop the tapes rolling off when socks, compression or footwear are worn.

Where symptoms are chronic, to enhance lymphatic flow of the whole limb, KT can be applied from inguinal lymph nodes and laid distally down the thigh to below the knee, even if only the calf appears to require treatment. Often, as with compression, if application stops at the knee, excess fluid is drawn from the lower leg and causes oedema to collect above the knee and restrict movement (Rabe et al, 2020).

To enhance the drawing effect, fans can be laid over each other to form lattices, and

further reduce tissue pressure in areas where tapes are crossed. This can focus drainage intensity by providing several different pressures within one treatment area. Stubborn oedema, bruising, haematomas and seromas are treated this way, as demonstrated in **Figure 2** (Anvar, 2015).

Even if ulcers are present, taping the periwound area will improve oxygenation of the tissues and enhance healing time. During the crucial 3-month time period, where 80% of ulcers reoccur (Probst et al, 2023), LKT can be applied onto new, fragile skin to promote healthy blood supply and prevent further necrosis caused by lack of oxygen. LKT is also useful to control pain, oedema and fibrosis in patients with post-thrombotic syndrome (Naci et al, 2020).

Muscular movement of the limb dynamically changes the tapes' action on the skin, alternating tissue pressures and stimulating the mechanoreceptors below. To maximise this potential, the tape is applied with the area to be taped anatomically stretched if possible:

- knee bent/ankle plantarflexed to tape on the anterior calf
- toes curled/ankle plantarflexed/ knee bent to lengthen dorsum of foot
- knee straight /ankle dorsiflexed (toes up) for posterior calf
- foot inverted to tape lateral malleolus area
- foot everted for medial foot applications.

Tape is then applied without stretch, so when the skin assumes its neutral position, tapes recoil to form corrugations which move with the skin (Sijmonsma, 2010). Consequently, with





Figure 3a



Figure 3b

movement, a pump or micro-massage effect is created (Hamza et al, 2020). The corrugations not only deform the fascia under the tape, but influence the tension and consistency of deeper, more distant fascia, and the limb as a whole (Pamuk and Yucesoy, 2015).

**Fear of doing harm**

Fear of doing harm is reported as a barrier to treating high-risk patients (Elwell & Sneddon, 2019). **Figures 3a** and **3b** demonstrate the consequence of failing to tape over a 'liposuction burn' caused by aggressive cannula use. The resulting necrotic wound required months of recovery and a skin

graft to heal. These injuries (see Case 2) occur regularly with high volume, non-cosmetic liposuction, exacerbated by stasis caused by ill-fitting post-surgical compression garments, bunching at joints and tourniqueting blood supply to wounded tissues (Ormseth et al, 2023). Many lipoedema patients have high Body Mass Indexes (BMI), PAD, VI and comorbidities, which make them slow to heal, including diabetes and smoking (Orhurhu et al, 2021). Since this case, LKT has been applied directly over ecchymosis, regardless of cause, size or colour depth, and left in place, until desquamation removes it. Tissue breakdown is always avoided (Anvar,

**Case 1. LKT on a post-liposuction lipoedema patient**

- LKT can be utilised on healthy, post-surgical liposuction patients for the reduction of pain and oedema, and to stop necrosis (Anvar, 2022; Zingarreti et al, 2023)
- Figures a-c below show improvements in bruise colour following the application of LKT



Figure a) 3 days post-liposuction



Figure b) 6 days post-liposuction



Figure c) 9 days post-liposuction.

### Case 2. LKT vs Compression garments

- Following liposuction, compression garments are fitted by surgeons
- These garments can cause friction and necrosis if they fit incorrectly
- LKT can be used alternatively, to prevent friction damage which can lead to necrosis



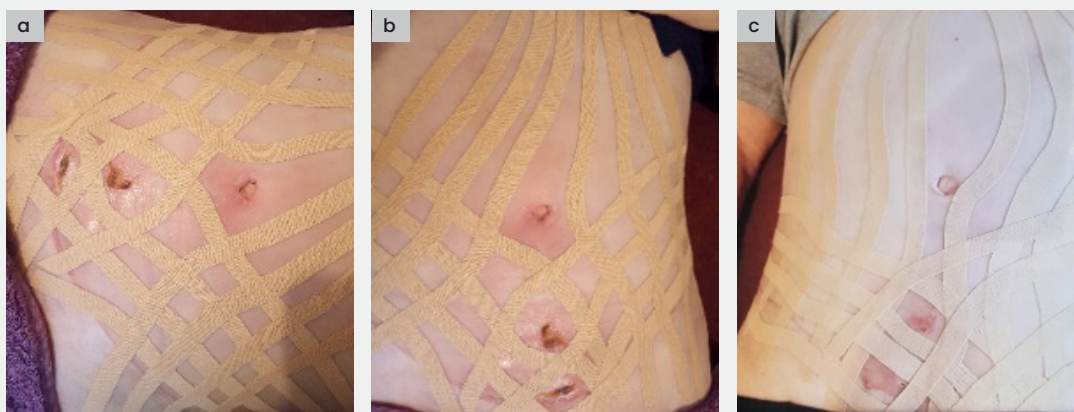
Figure a) Skin damage caused by ill-fitting compression garment



Figure b) Difference in bruise colour two days post-LKT

### Case 3. Periwound application of LKT for post-abdominoplasty necrotic ulcers

- Following an abdominoplasty, the patient sustained a haematoma which subsequently necrotised and formed ulcers
- LKT was applied to the periwound area to improve oxygenation and enhance wound healing
- Taping was left *in situ* for a week and was replaced once, over the 2-week treatment period



Figures a-c) Wound healing of post-abdominoplasty necrotic ulcers following the periwound LKT application, over 2 weeks

2022). The following case studies document beneficial results, where 'doing harm' could constitute inaction.

### Conclusion

Banergee (2019) reports that the main barriers to widespread use of KT are a lack of awareness or research evidence on efficacy. The paucity of literature should not preclude its use. LKT is a powerful tool, which can be applied to all symptomatic manifestations of PAD or CVI at every stage of degeneration, to reoxygenate tissues, alleviate lymphatic stasis and improve outcomes, while interacting with and addressing the venous, lymphatic and myofascial causes.

KT has few risks and treatment can be commenced even when patients are frail or ABPI contraindicates compression. LKT could halt the cycle of recurrent leg ulcers as it

addresses the lymphascial involvement, which has been unreported to date. ●

### References

- Aguilar-Ferrández ME, Castro-Sánchez AM, Matarán-Peñarrocha GA et al (2014) A randomized controlled trial of a mixed Kinesio taping-compression technique on venous symptoms, pain, peripheral venous flow, clinical severity and overall health status in postmenopausal women with chronic venous insufficiency. *Clinical Rehabilitation* 28(1): 69-81
- Alamilla-Sanchez ME, Alcalá-Salgado MA, Cerezo Samperio B et al (2023) Advances in the physiology of transvascular exchange and a new look at rational fluid prescription. *Int J Gen Med* 16: 2753-70
- Andriessen A, Apelqvist J, Mosti G et al (2017) Compression therapy for venous leg ulcers: risk factors for adverse events and complications, contraindications - a review of present guidelines. *J Eur Acad Dermatol Venereol* 31(9): 1562-68
- Anvar C (2016) On Tape. Available at: <https://www.slideshare.net/slideshow/lymphascial-kinesiotaping-for-postsurgical-recovery-written-by-clare-anvar-msc-for-aesthetic-medicine/129689371> (accessed 01.06.2024)
- Anvar C (2022) A novel approach for the use of Lymphascial Kinesiology taping to reduce oedema, ecchymosis and the



**Case 4. LKT of a 56-year-old female patient with advanced cancer (Pyszora and Krajnik, 2010)**

- The patient presented with lymphoedema and a haematoma following an advanced cancer diagnosis
- LKT was commenced in preference to multi-layer bandaging due to severe pain experienced by the patient
- Lateral anterior lower leg taping was applied, with the fan tape anchor starting at the lateral aspect of the knee with no tension. The tails of the tape were applied at 15-25% tension to the anterior, medial and posterior aspects of the lower leg
- Tapes remained on the skin for three days, and the patient claimed that symptoms (oedema, pain and feeling of heaviness) had decreased
- LKT was also applied to the patient's arm to improve haematoma healing [Figures a-c]



Figure a) Initial presentation of the haematoma



Figure b) Application of LKT



Figure c) Improvement in skin bruising following the application of LKT

**Case 5. LKT of an 88-year-old female patient with a crush injury (Morbiwala, 2010)**

- The patient presented with a crush injury to her left calf muscle. The skin on the affected calf and inner thigh was blistered, and there was significant swelling of her left calf as well as significant ecchymosis, both anterior to the tibia and in the calf
- Patient was admitted due to the potential of developing compartment syndrome, rhabdomyolysis or soft tissue sloughing
- LKT was applied six days post-injury using a fan cut taping technique with 10-25% tension over the inner and outer thigh, as well as the leg and calf area with the base at the inguinal and popliteal lymph nodes [Figure a]
- 18 days post-injury, significant improvement of haematoma, blistering and ecchymosis was observed [Figure b]



Figure a) 6 days post injury



Figure b) 18 days post injury

- risk of skin necrosis in certain post-liposuction patients. Presented at: Tissue Viability Society (TVS) online conference.
- Artioli D, Bertolini G (2014) Kinesio taping: application and results on pain: systematic review. *Fisioterapia e Pesquisa* 21(1). Available at: <https://www.scielo.br/j/ftp/a/LTrVSBPGCpYv7Z9ntV4VpwB/?lang=en> (accessed 06.06.2024)
- Atkin L, Bullock L, Chadwick P et al (2021) Making legs matter: A case for system change and transformation in lower-limb management. *J Wound Care* 30(Suppl1): S1–25
- Banerjee G, Briggs M, Johnson MI (2020) The immediate effects of kinesiology taping on cutaneous blood flow in healthy humans under resting conditions: A randomised controlled repeated-measures laboratory study. *PLoS One* 15(2): e0229386
- Bordoni B, Lintonbon D, Morabito B (2018) Meaning of the solid and liquid fascia to reconsider the model of biotensegrity. *Cureus* 10(7): e2922
- Bordoni B, Varacallo MA, Morabito B et al (2019) Biotensegrity or Fascintegrit? *Cureus* 11(6): e4819
- Caggiati A (2005) The “interfascial” veins of the lower limbs. *Ital J Anat Embryol* 110(2 Suppl 1): 97–102
- Carlson JA (2014) Lymphedema and subclinical lymphostasis (microlymphedema) facilitate cutaneous infection, inflammatory dermatoses, and neoplasia: A locus minoris resistentiae. *Clin Dermatol* 32(5): 599–615
- Cassar K (2006) Intermittent claudication. *BMJ* 333(7576): 1002–5
- Elif U, Günay U, Derya O (2021) Acute effect of kinesiology taping on muscle strength, tissue temperature, balance, and mobility in female patients with osteoarthritis of the knee. *Somatosens Mot Res* 38(1): 48–53
- Elwell R, Sneddon M (2019) Introducing the British Lymphology Society position paper on ankle brachial pressure index. *Br J Community Nurs* 24(5): 206–211
- Fede C, Petrelli L, Pirri C et al (2022) Innervation of human superficial fascia. *Front Neuroanat* 29(16): 981426
- Ganjaei KG, Ray JW, Waite B et al (2020) The fascial system in musculoskeletal function and myofascial pain. *Curr Phys Med Rehabil Rep* 8(4): 1–9
- Gray R, Voegeli D, Bader D (2016) Features of lymphatic dysfunction in compressed skin tissues – Implications in pressure ulcer aetiology. *J Tissue Viability* 25(1): 26–3
- Guest JF, Fuller GW (2023) Cohort study assessing the impact of COVID-19 on venous leg ulcer management and associated clinical outcomes in clinical practice in the UK. *BMJ open* 13(2): e068845
- Hamzah A, Berliana B, Pitriani P et al (2020) The effects of kinesio taping on the lower-body injury rehabilitation in female futsal athletes. *Advances Health Sciences Res* 21: 144–7
- Iliff AJ, Xu XZS (2018) A mechanosensitive GPCR that detects the bloody force. *Cell* 173(3): 542–4
- Jackson K, Simon JE, Docherty CL (2016) Extended use of Kinesiology tape and balance in participants with chronic ankle instability. *J Athl Train*. 51(1):16–21
- Kafa N, Citaker S, Omeroglu S et al (2015) Effects of kinesiological taping on epidermal-dermal distance, pain, edema and inflammation after experimentally induced soft tissue trauma. *Physiother Theory Pract*. 31(8): 556–61
- Kase K (2006) Kinesio Taping for Lymphoedema and Chronic Swelling. Kinesio Taping Association, USA
- Kase K, Wallis J, Kase T (2013) Clinical Therapeutic Applications of the Kinesio Taping Method. 3rd edn. Kinesio USA
- Krizanova O, Penesova A, Hokynkova A et al (2024) Chronic venous insufficiency and venous leg ulcers: Aetiology, on the pathophysiology-based treatment. *International Wound Journal* 21(2): e14405
- Kyle D, Boylan L, Wilson L et al (2020) Accuracy of peripheral arterial disease registers in UK general practice: Case-control study. *J Prim Care Community Health* 11: 1–6
- Langevin HM (2021) Fascia mobility, proprioception, and myofascial pain. *Life* 11(668): 1–11
- Leng F, Yang Z, Long F et al (2019) Kinesio tape in the treatment of postoperative lymphedema of breast cancer. *TMR Non-Drug Therapy* 2(2): 36–41
- Levick JR, Michel CC (2010) Microvascular fluid exchange and the revised Starling principle. *Cardiovasc Res* 87(2): 198–210
- McGuire J, Patel AJ, Adduru R (2022) Lymphatic immunopathy and its importance in chronic wound healing. *Lower Extremity Review*. Available at: <https://lermagazine.com/home/lymphatic-immunopathy-and-its-importance-in-chronic-wound-healing> (accessed 01.06.2024)
- Moffatt C, Gaskin R, Sykorova M (2019). Prevalence and risk factors for chronic edema in the UK. *Community Nursing Services. Lymphat Res Biol* 17(2): 147–154
- Morbiwala S (2010) Case Report: Lymphatic and blood flow effects of Kinesio Taping. Available at: <https://kinesiotaping.com/case-report-lymphatic-and-blood-flow-effects-of-kinesio-taping/> (accessed 01.06.2024)
- Mortimer P, Rockson S (2014) New developments in clinical aspects of lymphatic disease. *J Clin Invest* 124(3): 915–21
- Naci B, Ozyilmaz S, Aygutalp N et al (2020) Effects of Kinesio Taping and compression stockings on pain, edema, functional capacity and quality of life in patients with chronic venous disease: a randomized controlled trial. *Clinical Rehabil* 34(6): 783–93
- National Institute for Health and Care Excellence (2022) Compression Stockings. Available at: <https://cks.nice.org.uk/topics/compression-stockings/#:~:text=ABPI%200.8%E2%80%931.3%20%E2%80%94%20compression%20stockings,referred%20for%20specialist%20vascular%20assessment> (accessed 01.03.2024)
- Orhurhu V, Chu R, Xie K, Kamanyi GN et al (2021) Management of lower extremity pain from chronic venous insufficiency: A comprehensive review. *Cardiol Ther* 10(1): 111–40
- Ormseth BH, Livermore NR, Schoenbrunner AR et al (2023). The use of postoperative compression garments in plastic surgery – necessary or not? A practical review. *Plast Reconstr Surg Glob Open* 11(9): e5293
- Pamuk U, Yucesoy C (2015) MRI analyses show that kinesio taping affects much more than just the targeted superficial tissues and causes heterogeneous deformations within the whole limb. *J Biomech* 48(16): 4262–70
- Pekyavaş NÖ, Tunay VB, Akbayrak T et al (2014) Complex decongestive therapy and taping for patients with postmastectomy lymphedema: a randomized controlled study. *Eur J Oncol Nurs* 18(6): 585–90
- Probst S, Saini C, Gschwind G et al (2023). Prevalence and incidence of venous leg ulcers – A systematic review and meta-analysis. *Int Wound J* 20(9): 3906–21
- Pyszora A, Krajnik M (2010) Is Kinesio Taping useful for advanced cancer lymphoedema treatment? A case report. *Adv Pall Med* 9(4): 141–44
- Rabe E, Partsch H, Morrison N et al (2020) Risks and contraindications of medical compression treatment – A critical reappraisal. An international consensus statement. *Phlebology* 35(7):447–60
- Rümenapf G, Morbach S, Schmidt A et al (2020) Intermittent claudication and asymptomatic peripheral arterial disease. *Dtsch Arztebl Int* 117(11): 188–93
- Sharkey J (2020) Biotensegrity – The Structure of Life. In: Lesondak D. ed. *Fascia, Function, and Medical Applications*. Boca Raton: 99–113
- Sijmonsma J (2010) *Lymph Taping: Theory, Technique, Practice*. 1st edn. Fysionair Hof van Twente, New York
- Sobiech M, Czępińska A, Zieliński G et al (2022). Does application of lymphatic drainage with kinesiology taping have any effect on the extent of edema and range of motion in early Postoperative Recovery following Primary Endoprosthetics of the Knee Joint? *J Clin Med* 11(12): 3456
- Spiridon M, Corduneanu D (2017) Chronic venous insufficiency: a frequently underdiagnosed and undertreated pathology. *Maedica (Bucur)* 12(1): 59–61



- Stanton J (2023). Implementing a new regimen to manage a difficult-to-heal lymphovenous leg ulcer. *Br J Nurs* 32(15): S20–24
- Tadeo I, Berbegall AP, Escudero LM et al (2014). Biotensegrity of the extracellular matrix: physiology, dynamic mechanical balance, and implications in oncology and mechanotherapy. *Front Oncol* 4(3): 9
- Titze J (2013) Interstitial fluid homeostasis and pressure: news from the black box. *Kidney Int* 84(5): 869–71
- Tsai HJ, Hung HC, Yang JL et al (2009) Could Kinesio tape replace the bandage in decongestive lymphatic therapy for breast-cancer-related lymphedema? A pilot study. *Support Care Can* 17(11): 1353–60
- Tuckey B, Sorbely J, Rigney G et al (2021) Impaired lymphatic drainage and interstitial inflammatory stasis in chronic musculoskeletal and idiopathic pain syndromes: exploring a novel mechanism. *Front Pain Res* 23(2): 691740
- Tunakova V, Tunak M, Mullerova J et al (2017) Material, structure, chosen mechanical and comfort properties of kinesiology tape. *The Journal of The Textile Inst* 108(12): 2132–46
- Wiig H, Luft FC, Titze JM (2018) The interstitium conducts extrarenal storage of sodium and represents a third compartment essential for extracellular volume and blood pressure homeostasis. *Acta Physiol (Oxf)* 222(3): e13006
- Williams KJ, Ayekoloye O, Moore HM et al (2014) The calf muscle pump revisited. *Journal Vas Surgery: Venous and Lymphatic Disorders* 2(3): 329–34
- Wu WT, Hong CZ, Chou LW (2015) The kinesio taping method for myofascial pain control. *Evid Based Complement Alternat Med* 2015: 950519
- Yam ML, Yang Z, Zee BC et al (2019) Effects of Kinesio tape on lower limb muscle strength, hop test, and vertical jump performances: a meta-analysis. *BMC Musculoskeletal Disord* 20(1): 212
- Yang J (2023) A systematic review of kinesiology taping in patients with lymphedema. *Phys Ther Korea* 30(4): 288–305
- Zawieja DC (2009) Contractile physiology of lymphatics. *Lymphat Res Biol* 7(2): 87–96
- Zingaretti N, Albanese R, Pisano G et al (2023) Evaluation of kinesio taping for edema, ecchymosis, and pain after liposuction: A prospective pilot study. *Aesthet Surg J* 43(10): 787–96