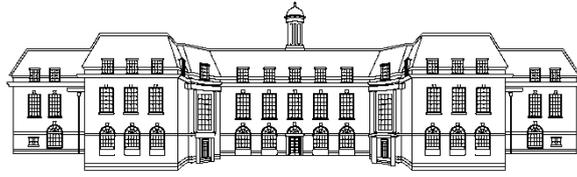


A COMPARATIVE STUDY BETWEEN SELF MYOFASCIAL RELEASE  
AND EMMETT TECHNIQUE EFFECTIVENESS IN THE MANAGEMENT  
OF FASCIAL (ILIOTIBIAL BAND) TIGHTNESS

Victoria Sharp

BSc (Hons) 2012



STRANMILLIS  
UNIVERSITY COLLEGE

A College of Queen's University Belfast

**DISSERTATION DECLARATION**

*I hereby declare that with effect from the date on which the dissertation is deposited in the library of Stranmillis University College, I permit the Librarian to allow the dissertation to be copied in part or in whole without reference to me on the understanding that such authority applies to single copies for purposes of research and private study and normal conditions of acknowledgement are followed.*

**Signed:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**An investigation of the comparison between Self myofascial release and Emmett  
technique for effectiveness in the management of fascial (iliotibial band) tightness**

This study is submitted in part fulfilment  
of the requirements for the BSc (Hons)  
Degree of Queen's University, Belfast

Victoria Sharp

College No. 40035717

Stranmillis University College

May 2012

## **ABSTRACT**

The term 'myofascial release' encompasses various techniques used to release fascial restrictions, which may cause neuromusculoskeletal pathology. The iliotibial band has been well documented to be a common site of overuse injury, especially in runners. The purpose of the randomised study was to assess which intervention releases myofascial restriction most effectively: The foam rolling technique (SMR) or the application of emmett technique. For expediency it deals only with the iliotibial band. 15 male semi professional rugby union players were randomly assigned to 3 groups (Emmett: n =5, SMR: n=5, Control: n =5) examine whether foam rolling or emmett technique was a more effective method for releasing myofascial restriction of the iliotibial band. The dependant variables, active range of motion and vertical jump height were taken pre- and post- intervention for all three groups. Data was analysed through the use of descriptive statistics using Microsoft Exel. Significant increases in range of motion were found for emmett technique when comparing pre-test scores to post-test scores. For each of the dependant variables measured, foam rolling was shown to have no significant effect, therefore was not as effective as emmett technique, supporting the hypothesis. Questions remain as to how and why some manual therapies work and who responds best. Although myofascial release may be effective at managing pain and restrictions, addressing the reasons for the restriction is important for optimal physical function.

## **ACKNOWLEDGEMENTS**

Acknowledgements go to the group of 15 volunteers who kindly donated their time to this study.

The author would like to sincerely thank Stephen Wallace for his ongoing support and thoughtful critique.

Appreciation is extended to the rugby club for the use of their facility, and to Gareth Rourke, Tanya Ross, and Donal Campbell, for their support and assistance.

# CONTENTS

CHAPTER ONE- LITERATURE REVIEW	1
Introduction	1
Background	2
Fascia	2
Therapies	5
Emmett Technique	7
Self Myofascial Release	9
Anatomy	11
Conclusion	13
CHAPTER TWO- RESEARCH DESIGN	15
Part A	15
Part B	16
Part C	21
CHAPTER THREE- PRESENTATION OF RESULTS	22
CHAPTER FOUR- ANALYSIS OF RESULTS	27
Range of Motion	27
Vertical Jump	29
CHAPTER FIVE- CONCLUSION & RECOMMENDATIONS	31
Discussion	31
Study Limitations	32
Recommendations	33
REFERENCES	35
APPENDICES	44

## CHAPER ONE- Literature Review

### **Introduction**

About 50% of musculoskeletal injuries involve the knee joint, with patellofemoral joint disorders accounting as the most common cause. (Bevilaqua-Grossi et al, 2004). Knee injuries are regularly cited as a sport-related injury ([www.sportsinjuryclinic.net](http://www.sportsinjuryclinic.net), Zarins & Adams, 1988), with lengthy recovery times and a high risk of recurrence (Dallalana et al, 2007).

Chaitow & Walker-DeLany (2002, p358) quote Rolf (1977) when they emphasise that, “TFL or fibres of vastus lateralis lying deep to the iliotibial band can be ‘riddled’ with sensitive fibrotic deposits and trigger point activity. Persistent exercise, such as running, will shorten and toughen the ITB ‘until it becomes reminiscent of a steel cable’.” This occurs due to the postural TFL muscle working to stabilise the knee by tensing the ITB, in this way it acts to control movement rather than produce it. Although postural muscles structurally adapt to resist prolonged gravitational tension, when overly stressed these muscles become irritable, tight, shortened, and demonstrate characteristics known as myofascial trigger points. (Chaitow & Walker-DeLany 2002).

As running is an intrinsic element of field based sports, such as rugby; a quick and effective method of releasing the structures that influence the gaiting mechanics could prove invaluable in certain overuse conditions affecting the knee.

## **Background**

As indicated by Mc Ardle et al (2006); the human body is such a complex array of structures and networks, it has inspired much research. The study of kinesiology has been largely concentrated on the muscle-bone concept, with the connective (fascial) tissues that mediate between the two having received comparatively little scientific attention, thus are less well understood (Findley & Schleip 2007). Attention to the fascial tissues and their properties is essential for sustained change in the postural basis of movement. Earls & Myers (2010) describe fascia as the missing element in the body's movement/stability equation, and use the concept of the fascial webwork to suggest that, "the illusion of separate muscles is created by the anatomist's scalpel, dividing tissues along the planes of fascia." Hence through this process the uniting element of the fascial webwork is obscured. Schultz & Feitis (1996, p1) expressed a similar theory; that the living body functions in seamless integration. "When one part moves, the body responds. Functionally, the only tissue that can mediate such responsiveness is the connective tissue."

## **Fascia**

The body's connective tissue matrix is analogous to the fascia, they are one and the same, spreading throughout the body in a three-dimensional web. Seeley et al (2000) explains that connective tissue types blend into one another, meaning the transition points cannot be precisely defined. The classification method for fascia is therefore somewhat arbitrary. As suggested by Barnes (1997, p233) the very term connective tissue denotes its primary role; "a tissue that interrelates every part of the whole, creating an integrated body." A type of geometry known as 'tensegrity' (tensional integrity), describes the structuring of the human body as the integrity of the structures resting on the balance of tensional forces, rather than

compressional forces. The skeleton can therefore be viewed as a single tensional webwork (in which the bony shafts float) instead of a robust framework (Earls & Myers, 2010, Chan & Ingber, 1999). The fascial system tends to move with fluidity and is unrestricted to provide stability and structural support and cushioning. Though when it becomes distressed, it is now known (Barnes 1997, Earls & Myers 2010, Liptan 2010, Meltzer et al 2010, Cubick et al 2011) that the normal biomechanics of the body are disrupted, in turn increasing the tension exerted on the system causing myofascial pain and reduced range of motion. This term 'myofascial' encompasses muscle and fascia together. Earls & Myers (2010, p16) state, "the body is designed to distribute strain globally, not to focus it locally." Myofascial pain is presented by areas of localised soft tissue known as trigger points (TrP). It is suggested that these occur as result of the chronic tension caused by inappropriate fascial shortness or laxity (Earls & Myers, 2010). Chaitow & Walker-DeLany (2002, p18) and Ge et al (2011) both cite the definition of a myofascial trigger point (MTrP) from Simons et al (1999) as: "A hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band. The spot is painful on compression..." The taut band is subjectively felt by the therapist. After an ultrasound visualisation of the taut band and reviewing magnetic resonance elastography, Ge et al (2011) added that the taut band is a detectable and quantifiable tool for MTrP diagnosis. However Simons (2002, p82) stipulates that while all MTrPs have a taut band, "not all taut bands are palpable." He identifies the reasons for MTrPs being inaccessible to palpation as: intervening muscles, intervening aponeuroses (a thin, flat, broad sheet of fascia), tense and thick subcutaneous tissue, and inadequate palpation skill.

Dodd et al (2006) demonstrated that fibroblasts alter shape and alignment in response to unbalanced, repetitive mechanical strain. This mutability and remodelling in response to mechanical stress is one of fascia's hallmarks (Liptan 2010). Fascia is richly innervated, and

the principle cell of the fascia, the fibroblast carries out the role of inflammatory regulation and wound repair. Although fascia was once considered as having a passive role, transmitting tension/force created by muscle activity or external forces; there is now evidence to suggest (Schleip et al 2005, Hinz 2006) it may have a contractibility property similar to smooth muscle tissue. Liptan (2010, p6) acknowledges Schleip et al (2005, 2006) in her explanation, “Some fibroblasts, called myofibroblasts, express alpha-smooth-muscle actin and are able to contract.” Simmonds et al (2010) also cites Schleip et al. (2006) when implying that Myofibroblasts appear to be a typical component of fascia and are also observed in epimysium and perimysium within the structure of skeletal muscles. “The contractile nature of these cells appears to give them ability to alter tissue tension, through contraction and relaxation, in the short timescales observed in practice.” Simmons et al (2010).

Liptan (2010) acknowledges Langevin (2008) when addressing how excessive mechanical stress, inflammation or immobility can result in extreme and disorganised collagen and matrix deposition resulting in fibrosis and adhesions. Following an investigation into the molecular and cellular effects of modelled repetitive strain and myofascial release on human fibroblast constructs in vitro, Melzer et al (2010) concluded that “several morphological changes in fibroblasts seen post repetitive strain are reversed if followed by modelled myofascial release.” Simmonds et al (2010) confirms these morphological changes after reviewing a study by Langevin et al (2005). It must be noted though that this earlier study was carried out on mouse tissue in vivo. They add that the time taken for the response was in the order of 2 hours, whereas Barns (1997) notes 90-120 seconds for a response to be felt following myofascial release.

## **Therapies**

Manual therapies encompass a host of techniques primarily concerned with the structures and systems of the body, including the joints and the soft tissues. The collective element of these manual therapies is the application of manipulative interventions in the highly innervated muscle and connective tissues. Schultz & Feitis (1996) imply that the original connective tissue therapy based around the myofascial concept was Rolfing, developed by Dr. Ida Rolf in the late 1930's. Today, many forms of bodywork that includes a soft tissue technique exist; with Bowen therapy, Emmett technique, deep tissue massage, neuromuscular techniques (NMT), Muscle Energy Techniques (MET) and foam rolling to name a few (Chaitow & Walker DeLany 2002, Findlay & Schleip 2007, Schultz & Feitis, 1996). "Common to these healing approaches is the assumption that reducing stresses and improving alignment of the skeleton and its associated soft tissues will, because of the interrelatedness of the body parts, stimulate the body's innate ability to heal." Findley & Schleip. (2007, p12). Meltzer et al (2010) cite the work of Hou et al (2002) and Fernandez de las Pena et al (2005) when proposing that myofascial release is effective for reducing tissue tenderness and providing immediate relief of pain when combined with conventional treatment. Premkumar (2004, p375) confirms these claims after reviewing a study by Cochran-Fritz (1993); "manipulation interrupts the pain-spasm cycle by reducing pressure on nerves through an initiated relaxation of local muscles, increasing blood flow and removing chemicals that stimulate pain receptors."

Marr et al (2011) describe the Bowen technique as a soft tissue remedial therapy, developed in 1994 by Tom Bowen. The technique provides gentle rolling movements over the fascial interfaces without heating, stretching or loading of the tissues. An advantage of applying Bowen technique is that it is not taxing on the therapist's body. Bowen technique requires leaving the subject alone in the treatment room for a few minutes between each

sequence of manipulation moves to prompt the body to reset, repair and balance itself. Incorporating these breaks is a reason the Bowen technique was not chosen for this study, “In addition the client may well walk out of the treatment room having felt little or no improvement...problems can often be dealt with within two or three treatments.” [www.thebowentechnique.com](http://www.thebowentechnique.com) As this study is exploring the effectiveness of techniques on myofascial release, time of application and the period of noticeable change must be considered.

A contrasting approach to Bowen is highlighted in the application of the Muscle Energy Technique. Muscle Energy Technique (MET) is attributed to Fred Mitchell Sr., in 1958, and has now become part of the standardised osteopathic manipulation therapy. Karageanes (2005, p27) classifies MET as, “a direct technique in which the restrictive barrier is actively engaged to contract a muscle in a precisely controlled fashion against a distinct counter force... to stretch out a tight muscle or fascia.” With this technique the force of the client and the therapist must be equal (isometric contraction) and held for 3 to 5 seconds, a total of 3 to 5 times to overcome each new restrictive barrier. MET was developed before Proprioceptive Neuromuscular Facilitation (PNF) and although the two are very similar MET is utilized in therapy settings more often. It is viewed upon as the safer option of the two as contraction force is much less than that applied during PNF. MET affects the muscle’s tension receptors known as Golgi tendon organs, however according to Chaitow & Walker-DeLany (2002, p17), “the degree of subsequent inhibition of muscle tone is strongly debated.” Although in comparison MET is less technical to apply than Bowen, the therapist must be able to counteract the client’s force for each set. As this study is using a semi-professional rugby team, and aims to apply techniques to each selected player in one session; using MET could give rise to a limitation of the study.

A full discussion of the various therapies existing is beyond this article, though with such a variety of approaches and techniques available a comparison between a “hands on” and an equipment based approach could be valuable. Another matter is that the specific depth and direction of tissue manipulation is imperative (deep touch has been found to affect many nerve endings in the fascia) Earls & Myers (2010, p16). This study will investigate and review The Emmett Technique and Foam Rolling as effective methods for myofascial release of the iliotibial band.

### **Emmett Technique**

Touch is required for most daily activities and as a necessary method of communication to function in society. Earls & Myers (2010, p33) highlight that “The fingers are the most neurologically sensitive tool available to the therapist.” The Emmett technique was developed by Ross Emmett and is a remedial therapy that works in harmony with sensory and muscular receptors, using light application of pressure (in a perpendicular angle to the tissue) via the middle finger at particular points (trigger points). These points are focused on three times in one set for 5-20s each time. The significance of the three applications is known as ‘the power of three and relate to the client’s brain & body awareness.’ First touch is to recognise the problem, second to correct and thirdly to realise a change has occurred. It covers an entire range of moves to release many areas throughout the body and is less intrusive than conventional methods such as deep tissue massage and rollers. [www.rossemmett.com.au](http://www.rossemmett.com.au)

According to Sheriff (2011), who carried out a study on the effectiveness of the Emmett Technique for psoas release, releasing the iliotibial tract with the Emmett Technique

will result in better muscle recruitment of the surrounding tissues for lifts such as the squat, while avoiding the discomfort associated with foam rolling. Sherriff used himself (28yrs old) as the subject so an external therapist could perform the technique, eliminating bias. However this sample size is too incomplete to portray a true result for the effectiveness of the Emmett Technique for psoas release. As this current comparative study aims to determine the effects of releasing the iliotibial tract with Emmett Technique, his theory of better muscle recruitment for squats will hopefully be supported. Regrettably the references from this study highlighted that the amount of literature available on the Emmett Technique is extremely limited; as a result this claim with regard to the therapy application could not be supported through other studies. Lack of good research forces theorization and speculation on the perceived effects of any medium. Although supporting the Emmett technique claim cannot be directly verified, perhaps it can be supported indirectly: Ercole et al (2010, p319) reviewed the work of Barnes (1990) in their investigation of time required to modify fascial fibrosis, where it is suggested that “a sustained pressure applied into a restricted tissue barrier will cause this tissue to undergo histological length changes, and after a period of 90-120s, the tissue softens and becomes more pliable.” As Emmett technique is carried out by applying a constant pressure to a restricted tissue barrier (MTrP) to increase range of motion (achieved by the tissue becoming more pliable) then the above findings may help to confirm the work of Sherrif.

### **Self Myofascial Release (Foam Rolling)**

Self Myofascial Release (SMR) is a relatively simple technique performed by the athlete utilising an object with the intention of provoking a relaxation effect through adding more tension to the targeted soft tissues. The foam roller was initially introduced as a self-massage (self myofascial release) tool to the athletic and physical therapy communities by Physical Therapist Mike Clark. The surface area to be treated on largely determines what equipment will be used; for example the foam roller is a popular method for larger areas such as the iliotibial band, quadriceps, and hip adductors, whereas a tennis ball is often used to release the plantar fascia, tibialis anterior and wrist extensors (Robertson, 2008).

The sports Medicine Institute highlight the advantages of regularly using a foam roller on the iliotibial band as an effective way to release tightness that may be difficult to access with conventional stretches, as well as focusing on tight knots or bands within a muscle. “Regular use of the roller can be beneficial for enhancing performance, preventing injuries, and expediting injury recovery.” [www.smiweb.org](http://www.smiweb.org)

It must be highlighted though that there is no universal agreement over how often to roll, or how long to roll so only general guidelines can be provided. To present rationale for duration of SMR neuromuscular anatomy must be referred to. The technique stimulates the sensory receptors located in the junctions between muscles and their tendons (musculotendinous junction) known as Golgi Tendon Organs (GTO). These receptors are sensitive to change in tension and rate of tension change. Stimulation of the GTO's past a certain threshold inhibits the muscle spindle activity (a receptor detecting changes in fiber length), and decreases muscular tension, therefore muscle relaxation is promoted. Reduction in soft-tissue tension decreases pain, restores normal muscle length-tension relationships, and improves function. Hall (1995), Chaitow & Walker-DeLany (2002), Norris (2004), Palastanga et al (2006). Norris (2004) suggests that a minimum of 30seconds sustained pressure is required for this relaxation effect to occur. Referring back to the work of Barnes (1990), approximately

90seconds is recommended to experience release during neuromuscular technique. Simons (2002, p81) expressed, “If compression is applied for only a short period of time and then released, the shortened sarcomeres tend to return immediately to their previous state and little has been gained.” However if gentle compression is sustained until a release of pressure is felt, increased range of motion and reduced muscle tension correspond to “a degree of equalisation of sarcomere length.”

Some critics of SMR dispute its effectiveness due to the accessibility of foam rollers to people unaware of its safe use. Nelson (2008) points out that many unknowledgeable people using the technique experience pain, which in turn actually inhibits the nervous system. He also argues that concentrated efforts to release tension in a specific area often fail to address the source of the issue (as muscles function in groups with antagonistic pairing). While Nelson presents some good arguments for the misuse of SMR, he neglects to mention any specific research on foam rolling; and the evidence for the benefits and effectiveness of the technique (when performed correctly) out number his limited sources (Curran et al 2008, Hanten et al 2000). Dawn et al (2010) support the efficiency of the use of ischemic compression tools (such as the foam roller) in the treatment of MTrPs following their study on 28 people with 2 MTrPs in the upper back musculature. However they also highlight that randomised control studies are still lacking in this area.

Unfortunately most studies to date have focused on therapist-based rather than self-based treatment for myofascial release. The literature surrounding SMR was therefore very limited so in order to apply and evaluate the claims of foam rolling; studies that assessed the use of ischemic pressure were included in this review. Hanten et al (2000, p.999) conducted a random study on 40 adults to assess the effectiveness of a home program of ischemic pressure for MTrPs. Participants were randomly assigned to a control group (stretching only) or an intervention group (ischemic pressure and stretching). Following the study it was

contended that “ischemic pressure with muscle stretching is ideal for self-treatment” as the scores reflected much greater improvements for the intervention group than for the control group.

## **Anatomy**

As cited in Findley & Schleip (2007); Motion and posture are subject to external influences, and as biologic tissue is characterized by plasticity, it is susceptible to injury and can fail. This study will focus on the iliotibial band (ITB) or tract and its response to two myofascial release techniques (Emmett & Foam rolling). The ITB is a lateral thickening of the fascia lata in the thigh and works with the quadriceps to provide stability to the outside of the knee joint during movement. This is achieved by blending with the vastus lateralis tendon (which merges with the rectus femoris tendon as it approaches the lateral side of the patella), helping to form the expansion (of the capsule of the knee-joint) that finally attaches to the line which extends downwards to the tibial tuberosity, to a large extent replacing the knee joint capsule in this region. (Gray, 1995)

Functionally within the lower limb there are two types of fascia: superficial (a base for skin) and deep (dense, tough, fibrous tissue) (Palastanga et al, 2006). The ITB is composed of two layers of deep fascia on the lateral side of the thigh. It originates from above the tubercle of the iliac crest and descends across the anterolateral part of the knee joint to insert onto the lateral side of the lateral tibial condyle after blending with the joint capsule (please refer to Appendix 1: Anatomy diagram). It acts as a long insertion tendon for the attachment of certain muscles to bone. Chaitow & Walker-DeLany (2002), Palastanga et al (2006), Jarney (2008) and Gray (1995) discuss those muscles closely associated with the iliotibial tract in further detail in the following three paragraphs:

The tensor fascia lata muscle (TFL) descends between the gluteus maximus and Sartorius to insert between the two layers of the ITB (about one third of the way down the thigh). One of its actions is to straighten out the backward pull of the gluteus maximus on the ITB. It also tightens the tract, acting with the superficial fibres of gluteus maximus. On the medial side of the patella, the TFL delivers a few fibres inferiorly to merge with the Sartorius expansion. The TFL plays a vital role in pelvis and knee stabilisation during the mechanics of gaiting; as described by Palstanga et al (2006, p288) it “produces strong medial rotation when the hip is in extension & the lower limb, pelvis & trunk are prepared to take the thrust relayed through the lower limb by the calf muscles during the ‘toe-off’ phase of walking.” It is known (Palastanga 2006, Fairclough et al 2006, Taunton et al 2002) that a common association of lateral movement of the patella is a tight ITB. “Since the TFL/iliotibial band crosses both the hip and knee joints, spatial compression allows it to squeeze and compress cartilaginous elements... rotational displacement at the knee and hip will take place when it is no longer able to compress.” Chaitow & Walker-DeLany (2002, p358). This can in turn cause pain to the region and has been termed ‘runners knee.’

The major part of gluteus maximus also inserts between the two layers of the ITB a third of the way down. The ITB “receives most of the tendon of gluteus maximus.” Fairclough et al (2006, p309). The gluteus maximus is noted as the largest muscle of the lower body and although its prime function is to extend the hip and laterally rotate the femur at the hip, it has been expressed that its role in modulating the tension of ligaments and fasciae should not be over-looked. (Vleeming et al 1997 and Levangie & Norkin 2001; cited by Chaitow & Walker-DeLany 2002). The ITB fibres of gluteus maximus are responsible for abduction of the femur at the hip. The gluteus maximus decelerates tibial internal rotation via the iliotibial band; the muscle is therefore primarily recruited during running and jumping. Clark et al (2008).

Finally, the Vastus lateralis muscle is mentioned as an associated muscle of the ITB as trigger points in this muscle “make significant contributions to pain on the lateral hip, entire length of the thigh and into the lateral and posterior knee.” Chaitow & Walker-DeLany (2002, p485) The Vastus lateralis has attachments to the lateral side of the gluteal tuberosity and to the fascia lata. “Some fibres pass to the front of the lateral condyle of the tibia, blending with the iliotibial tract.” (Palastanga et al 2006, p285) This muscle acts to extend the leg at the knee and draw the patella laterally. Bevilaqua- Grossi et al (2004, p51) acknowledge the work of Ruffin & Kinningham (1993) when describing the Vastus lateralis muscle working with the iliotibial band as a dynamic stabiliser, “being responsible for lateral dynamic force.”

## **Conclusion**

Fascial release techniques are routine working practices in professions such as osteopaths, manual therapists and physical therapists; however the literature presented in this chapter highlights the need for improved understanding of fascia and its connection to musculoskeletal issues, such as ‘runners knee’ (ITBFS) and low back pain. Self-releasing myofascial restrictions could be an invaluable prevention tool against certain overuse injuries (such as iliotibial band friction syndrome/ runner’s knee); especially for those regularly participating in sport and exercise at high intensity levels. Therefore this study aims to compare the effectiveness of a manual technique (Emmett) against an equipment based technique (foam rolling) for releasing iliotibial band restriction.

## **Hypothesis**

Taunton et al (2002) conducted a case-control analysis of 2002 participants with running related injuries, 46% of which were men. It was found that injuries affecting the iliotibial band (the second most common site of injury) were significantly higher in men, with a lower age (mean <34) as a considerable risk factor. Another alarming trend is “there is a higher incidence of ITBFS in this study compared with previous years at the AMSMC (4.3% in 1981, 7.5% in 1981, and 8.4% in 2000).” This evidence presents rationale for the following study. It is suggested that the release of iliotibial band restriction through application of Emmett technique will be more effective when compared to foam rolling.

## **CHAPTER TWO- Research Design**

### **Part A**

**Objective:**

A tight iliotibial band (ITB) is a common cause of an overuse injury, well documented in runners and cyclists (Benjamin 2009, Fairclough 2006, Fredericson et al 2002). The objective of this study was to compare the relative effectiveness of two myofascial release techniques for the (ITB): Self Myofascial Release (SMR/Foam rolling), and Emmett Technique.

The two techniques evaluated in this study were selected for their ease of implementation, alleged effectiveness, and common usage (foam rolling).

### **Design:**

A quasi-experimental design was adopted for this study. Dependant variables included an active measurement of flexibility and a dynamic performance test for functional movement capacity (lower body power). Data were collected over two weeks using a repeated measures design.

### **Participants & sample selection:**

Rugby players were chosen as they play a field sport relying heavily on running capacity. Permission for the study was obtained from the team's head coach via a letter (appendix 2). The eight forward positions within a rugby team share a similar heavily built physique due to the comparable demands each position places on the body. This study would therefore expect to find common areas of tightness among the subjects and similar outcomes of the interventions.

15 asymptomatic non-professional rugby players were recruited ( $25.2 \pm 2.7$  years;  $185.2 \pm 8.3$  cm;  $108.1 \pm 13.6$  kg). All 15 subjects were male, played a forward position on an All

Ireland League team, and were aged 19-30. All potential participants were required to be able to engage in physical activity, and not regular yoga practitioners or any other developmental flexibility approach. A health questionnaire was used to screen potential study volunteers. Prior to engaging in any of the assessments, all participants were required to read and sign an informed consent form detailing the study procedures and their rights as a research participant (appendix 3 & 4). Exclusion criteria included treatment of lower limb myofascial pain or trigger points at the time of the study, and current or previous symptoms of pathology reported in the lower limbs or pelvis, resulting in any abstention during the current season.

## **PART B- Experimental design**

### **Interventions:**

Each subject was randomly assigned to one of three groups: Emmett group, self myofascial release (SMR) group, or the control group until each group had five subjects. The decision to assign three groups instead of two was made for the following reasons: The risk of the Emmett technique outcomes affecting the foam rolling outcomes and vice versa is eliminated as each subject is only exposed to one intervention. Secondly, with a control group assigned the difference between using an intervention and not could be highlighted more clearly (so coincidence of differing measurements should be ruled out), especially as the intervention sample sizes are small.

The Emmett technique and SMR interventions lasted an average of 5 minutes per subject, so the control group were re-tested after a 5 minute period but were not involved in either intervention (see 'test selection & procedures' section below). The decision to assign three groups instead of two was made for the following reasons: The risk of the Emmett technique

outcomes affecting the foam rolling outcomes and vice versa is eliminated as each subject is only exposed to one intervention. Secondly, with a control group assigned the difference between using an intervention and not could be highlighted more clearly (so coincidence of differing measurements should be ruled out), especially as the intervention sample sizes are small. Jones & Gratton (2003, p93)

*Diagrams for each intervention described below are available in the appendices (5-8).*

**Emmett:** The Emmett intervention was completed on each subject independently. With the subject sitting upright on a 45cm wooden chair; light, constant pressure via the middle finger (at a perpendicular angle to the skin) was applied at both points (diagrams in appendix 5), three times for 10-20s with 5-10s breaks between. A light sweeping action over the sensory area that was treated was performed once, using the back of the fingers. The rationale for this is that the light brushing action “disperses the sensory awareness to move without being too heavy or specific enough to create muscular response.” [www.rossemmett.com.au](http://www.rossemmett.com.au) (Ross Emmett refers to this as “making nice;” an action to “take away focus” once the technique is complete). The sequence performed on one side was then repeated on the opposite leg. In Ross Emmett’s teachings of the technique he insists on treatment of both sides when focusing on the lower body (for balance).

Once both sides were completed, the subject was instructed to walk around the room for a minute (lock in with action). This method was used on two sites, the ‘ITB’ site and the ‘Sartorius & ITB’ (illustrated in appendix 6). Palanga et al (2006, p288) describe the palpation location for tensor fascia lata as “halfway between the ASIS & the greater trochanter of the femur.” For ‘ITB’ release the Emmett technique locates one point of contact as the same position mentioned above.

**Self myofascial release:** The foam roller used was 6”x 38” club core roller model, manufactured from closed cell PE Recovery Memory Foam. Before beginning the SMR intervention each subject was educated on how to locate TFL (visually demonstrated then instructed subject to stand on one leg, palpate between the pelvis and head of femur then abduct and medially rotate the suspended leg). Again two locations were focused on (to eliminate any Emmett advantage), TFL and ITB (appendix 7 & 8). Although foam rolling is normally only carried out on the constricted region, both sides were treated, again in an endeavour to standardise intervention influences. Each subject was given a demonstration for correct positioning and technique on the foam roller for ITB and then for TFL. There was very clear instruction given to stop moving and hold a static position when an unusually tender point was located (TrP) until the sensation eased by approximately 50% (or for a maximum of 30 seconds if no ease was experienced) before continuing to cover the rest of the lateral thigh area. The ITB was treated first; slowly rolling the lateral aspect of the thigh down towards the knee, then back up to the start position. TFL on the same side was then rolled over before swapping to the other side. There was a maximum time of 60-90 seconds allocated for each region, this time guideline is consistent among SMR method techniques (Robertson M, 2008, [www.smiweb.org/roller.pdf](http://www.smiweb.org/roller.pdf), [www.visionfit.co.uk](http://www.visionfit.co.uk;);) )

**Test selection & measurement techniques:**

To minimise measurement error, the subjects were tested at the same time of day after scheduled team training (8:30pm). Measurements were collected at baseline and post-intervention and recorded on a spreadsheet. Attendance was recorded for all assessments (Refer to Appendix 9 for a blank example of results form). It must be highlighted that the

desired time to perform assessments was before team training sessions to avoid potentially accumulated fatigue impeding on the results. Unfortunately this was not feasible for the participants though. Testing occurred over a total of three training sessions, with one group tested per session.

Each subject, wearing loose shorts, had an active flexibility measurement taken and performed a vertical jump test; a countermovement jump (CMJ).

**Flexibility test:** The active range of motion (ROM) test was chosen to determine adduction moments at the hip using a 12" goniometer (360° plastic Idass). As the study is concerned with the effect of a tight ITB during gaiting, an active rather than passive ROM test may be a more valid indicator of functional range. Only the dominant leg was measured for flexibility, with dominance being identified as the preferred leg to kick a ball with. Subjects lay supine on a yoga mat with the hip in 0° internal/external rotation and 0° flexion/extension. The dominant leg was positioned in midline relative to the torso while the non-dominant leg was abducted slightly (maintaining movement restriction of ASIS) so as not to interfere with the movement of the leg being tested while movement at the pelvis was restricted. The stationary arm of the goniometer was aligned across the pelvis, 'connecting' the right and left ASIS. The fulcrum was placed over the ASIS of the leg being measured. Using the midline of the patella for reference, the moving arm of the goniometer was aligned with the anterior midline of the femur. The subject was instructed to slowly bring the dominant leg towards the other leg (without any internal/external rotation of the thigh), while the Achilles tendon remained close to the floor. The heel of the assessor's palm was placed on the ASIS of the dominant side to restrict pelvic rotation and once counter pressure against the hand was detected

subjects were advised to stop the movement and the angle was recorded. Assessment protocol obtained from Maud & Foster eds. (1995).

**Power test:** The vertical jump test was selected to measure lower body power (a relevant indicator of functional capacity in the lower body for rugby forwards). Power is a combination of muscular strength and movement speed, the counter movement jump (CMJ) test was utilised. “The CMJ is an indicator of lower body reactive ability or reactive strength.” [www.verticaljumping.com](http://www.verticaljumping.com)

This test was measured (cm) using a vertical jump meter (‘Jump-MD’ Takei, Japan). Participants were allowed a familiarisation period of 2 minutes (with 30s between jumps) before their assessed test was carried out. From a static upright position with feet hip width, participants were instructed to place hands on hips and for the countermovement jump descend to a desired squat then jump as high as they could immediately. To minimise differences in jump technique and to allow participants to concentrate on leg and hip explosiveness, the elimination of arm action during jumping was adopted by placing hands on hips. Each participant completed three jumps, taking 30seconds rest between each to eliminate the previous impacting on the next. The vertical jump meter then displayed the greatest height achieved from 3 and this was recorded. As the results were only used to compare differences between intervention effects pre- and post-test, only the distance in cm was needed; therefore plotting a graph of normative values to compare participants’ performance against each other would have been irrelevant, and so no calculations were carried out.

## **PART C- Analysis**

The quantitative data collected was recorded on a pre-produced spreadsheet (Microsoft Excel) according to the three groups. The interpretation of data began with comparing the mean values for ROM and CMJ across the three groups. Standard deviation was then highlighted on a graph and a t-test carried out to outline any significance probability. Presentation of results and analysis will be discussed in the following chapter, presented using Microsoft Word and Microsoft Excel format.

## **CHAPTER THREE- Presentation of Results**

As previously mentioned in chapter two, 15 All Ireland League forward position rugby players were selected for the investigation. It must be highlighted that due to the small sample size available all 15 participated fully in the study, albeit 3 of the participants disclosed on the health questionnaire that previous lower limb injuries resulted in missed training sessions and/or matches in the current season. To maintain validity of results, the three participants in

question were assigned to a different group each. This should be taken into consideration when reviewing the results.

On completion of data collection, statistical analyses comprised of descriptive statistics to identify means and standard deviations for each variable of interest, leading to any significances being presented in the t-tests.

All statistical analysis was carried out using Microsoft Excel

**Table 3.1: Range of Motion & Vertical Jump Results**

POSITION	D.L	GROUP	ROM pre test	ROM post test	CMJ pre test	CMJ post
Front Row Prop (TH)	R	SMR	10	10	42	40
Prop (LH)	R	SMR	8	8	42	47
Hooker	R	SMR	11	11	39	43
Prop (TH)	R	C	7	8	36	33
Hooker	R	C	6	6	35	35
Prop	R	C	9	10	39	40
2nd Row	R	SMR	10	11	48	42
2nd Row	L	ET	5	11	33	34
2nd Row	L	ET	10	17	54	53
2nd Row	R	C	11	10	30	29
Back Row	R	SMR	14	14	42	44
Back Row	R	ET	11	13	50	53

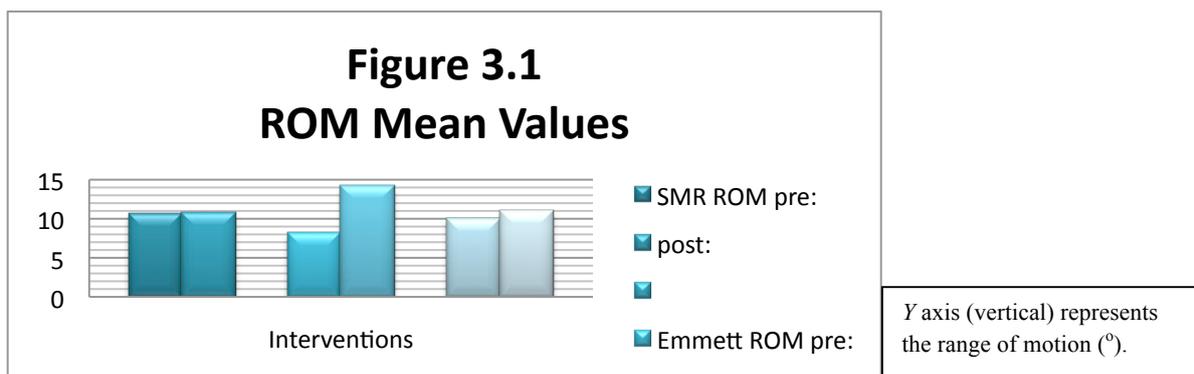
Back Row (n8)	L	ET	5	16	38	39
Back Row	R	ET	10	14	32	38
Back Row (n7)	R	C	18	18	40	43

Group: Foam rolling (SMR), Emmett technique (ET), Control group (C)

*The table illustrating results according to intervention group can be reviewed in appendix 10.*

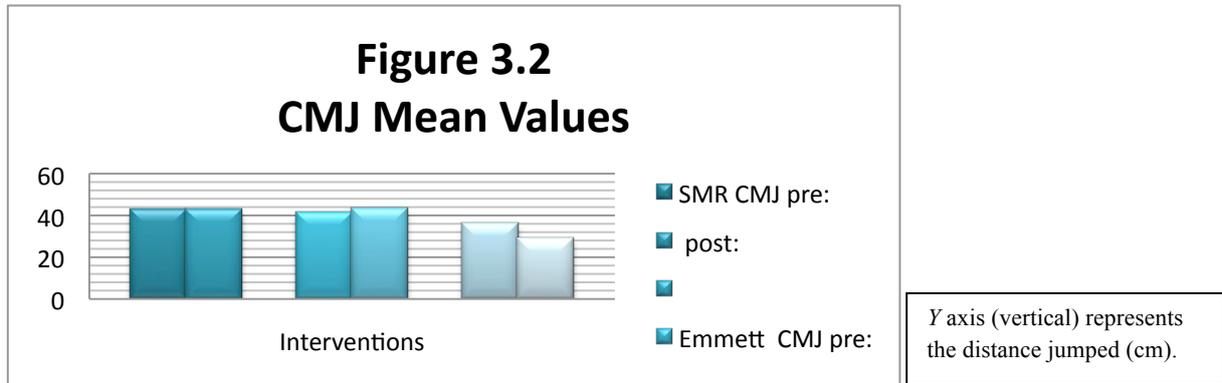
Table 3.1 is a comparison of the results across all three groups for active range of motion (ROM) and Counter movement jump (CMJ) both before and after intervention. The results are arranged according to the players' position (six front rows, four 2<sup>nd</sup> rows, five back rows). Due to a random group selection (except the 3 previously injured players), a comparison between positions could not be made. There were only 3 out of 15 players with a left dominant leg, and again due to random selection they were not placed into different groups so no comparison can be made between them. The following presentation of results will therefore concentrate on comparing only the intervention groups to highlight which (if any) is effective for releasing the iliotibial band.

A measure of central tendency (mean) was calculated using the data presented in table 3.1; The mean values aim to highlight any differences in the ROM and CMJ values following the specific intervention (if any) across the three groups. The mean values for range of motion and vertical jump are illustrated in figure 3.1 and 3.2 respectively:



**Figure 3.1: Range of motion mean**

From the chart above Emmett technique appears to be markedly more effective at increasing ROM than foam rolling.



**Figure 3.2: Vertical Jump mean**

Unfortunately there was no noticeable difference pre and post for either intervention, though the control group appear to have decreased in performance.

As mean values are only a representation of results data, and do not enlighten about the dispersion of the observations; standard deviation (SD) was calculated on the values presented in figure 3.1 and 3.2 to help avoid the risk of range distortion/variability. Table 3.2 reflects how accurate the mean values are.

**Table 3.2: Mean & SD values of Range of motion (ROM<sup>o</sup>) & vertical Jump (CMJ cm)**

Foam Rolling (SMR) mean ROM pre test:	10.6 (2.2)	Emmett technique (ET) mean ROM pre test:	8.2 (2.9)	Control group (C) mean ROM pre test:	10 (4.8)
SMR mean ROM post test:	10.8 (2.2)	ET mean ROM post test:	14. (2.4)	C mean ROM post test:	10.6 (4.6)
SMR mean CMJ pre:	42.6 (3.3)	ET mean CMJ pre:	41.4 (10.0)	C mean CMJ pre:	36 (3.9)
SMR mean CMJ post:	43.2 (2.6)	ET mean CMJ post:	43.4 (9.0)	C mean CMJ post:	36 (5.6)

Before discussing the standard deviation results, any statistical significance between the groups needs to be determined. This is depicted by the t-test results (post intervention) highlighted in Tables 3.3.1 and 3.4.1. Tables 3.3.2 and 3.4.2 highlight any significance of each group from pre test to post test.

**Table 3.3.1: Significance between range of motion results post test (across interventions)**

Intervention	Probability
Foam rolling vs. Emmett	0.02
Foam rolling vs. Control	0.87
Emmett vs. Control	0.15

**Table 3.3.2: Significance between range of motion results (pre-test and post-test)**

Intervention	probability
Emmett Pre- vs. post- test	0.004
Foam rolling Pre - vs. post -test	0.19
Control Pre- vs. Post- test	0.95

Making reference to figure 3.1 and tables 3.2.1, 3.3.1, 3.3.2; the difference between pre and post test mean range of motion for Emmett technique was the greatest between the three groups. The standard deviation supported the mean value with a variance of 25%. The hypothesis of Emmett technique as being more effective than foam rolling for iliotibial band release measured by range of motion is supported.

**Table 3.4.1: Significance between vertical jump results post test (across interventions)**

Intervention	Probability
Foam rolling vs. Emmett	0.48
Foam rolling vs. Control	0.04
Emmett vs. Control	0.16

**Table 3.4.2: Significance between vertical jump results (pre-test and post-test)**

<b>Intervention</b>	<b>Probability</b>
Emmett Pre - vs. Post- test	0.37
Foam rolling Pre- vs. Post- test	0.38
Control Pre - vs. Post- test	1

Tables 3.4.1 and 3.4.2 show no significance between vertical jump test results between foam rolling and Emmett technique when comparing the post test results across interventions, or when analysing pre and post data for the same intervention. The mean data (figure 3.2) also reflects this.

A full analysis, with consequent discussion of the results presented here will be made in chapter 4.

## **CHAPTER FOUR- Analysis & Discussion**

The objective of this chapter is to analyse the descriptive statistics presented in chapter 3 to determine which intervention (foam rolling or Emmett technique) is more effective for releasing the iliotibial band. A series of recommendations will be made following this analysis.

### **Range of Motion**

The mean values for range of motion (ROM) presented in figure 3.1 show a 70% increase between the pre and post test values for Emmett technique. Table 3.2 presents the Standard deviation of 2.9 (pre) and 2.4 (post), suggesting the mean values are a good representation of

the results as variance is low. These findings coincide with those from previous myofascial release studies, as Meltzer et al (2010) cites Sucher 1993; Hou et al 2002; Fernandez de las Penas et al 2005; Sucher et al 2005 while reporting improvements in signs and symptoms including reduced range of motion, compromised joint articulation, and discomfort; following myofascial release. It is therefore clear from the statistics presented in chapter 3 (see table 3.3.2) that Emmett technique had a significant impact on ROM ( $p = 0.004$ ).

There was no great difference for ROM as a result of foam rolling, with only a 2% increase from pre to post test results. Again the standard deviation was low at 2.2 for both mean values, suggesting that foam rolling is not as effective as Emmett technique for increasing ROM, and had no significant effect on ROM ( $p = 0.19$ ). This may be due to the standardisation of time, as effectiveness was measured according to the same amount of time spent on each intervention. Foam rolling may require greater time than Emmett technique if there are more tender areas (MTrPs) to rest upon to allow adequate stimulation of the GTOs.

From the table of t-values for various levels of significance across the interventions (table 3.3.1), it was discovered that the mean difference for ROM between foam rolling and Emmett is an effect related to the independent variable ( $p = 0.02$ ). Therefore providing sufficient evidence on which to support the hypothesis (or reject the null hypothesis).

There was no considerable change across mean ROM for the control group (6%), though the standard deviation was almost double that of Emmett and foam rolling (4.7) so the range variance was larger. Referring to table 3.1; 2 out of 5 subjects in the control group had differing ROM results pre and post test, with only 1° differentiation. The prediction that there would be no change pre and post test in the control group is still valid as the 1° change in 2/5 subjects may be due to either a slight measurement error (although every effort was taken to

avoid this) or, as highlighted by Gracovetsky (2010), that ROM is not entirely objective as it is under voluntary control and dependant on cooperation of the client.

ROM depends on such a large number of factors introducing variability and limiting reproducibility, that many investigators have discounted its diagnostic importance (Lea & Gerhardy, 1995; Samo et al., 1997; Mayer et al., 1997). However, as there is so much literature surrounding running injury causes (Fredricson et al 2002, Taunton et al 2002, Fairclough et al 2006, Cosca & Navazio 2007), and the implications of restricted movement resulting from a tight iliotibial band; ROM differences pre and post test are of considerable importance to establish the effectiveness of the myofascial release techniques used for this study. Meltzer et al (2010, p.168) support this justification by explaining that physical strain has been shown to influence active fascial contraction, “affecting passive and active resistance to motion which in turn leads to compromised joint articulation, discomfort, pain and reduced range of motion.”

### **Vertical Jump**

There was no significant change between foam rolling and Emmett groups for the vertical jump test ( $p = 0.48$ ), however foam rolling showed an improvement against control group ( $p = 0.04$ ). Referring to table 3.2, it is evident however that mean values between both groups varies too greatly to make this comparison valid. The standard deviations of 3.3 and 3.9 confirm the accuracy of these mean values. Table 3.4.2 clearly highlights that, as expected the control group had no significant impact on vertical jump height ( $p = 1$ ). However neither did foam rolling ( $p = 0.38$ ) or Emmett technique ( $p = 0.37$ ).

These findings may be explained by revisiting the purpose of myofascial techniques:

The vertical jump test was included because research has suggested that “muscle performance factors and altered loading mechanics have been linked to a variety of musculoskeletal disorder” Baker et al (2011, p550). Also the purpose of the ITB & Sartorius release Emmett technique move is to free restriction that curtails knee flexion (see appendix 6). “Joints are designed to be naturally mobile, so that a joint restriction needs to have an origin. Mc Parland & Simons (2006) observed an association between MTrPs and nearby articular dysfunction... joint hypomobility is mainly due to soft tissue restriction.” Simmonds et al (2010, p4). However as myofascial release occurs and the GTOs are stimulated, muscles become inhibited; meaning that following both emmett technique applications the sartorius and tensor fascia lata muscles along with the iliotibial band should have been in a relaxed state. The same applies for foam rolling with the tensor fascia lata and iliotibial band. The squat is a complex exercise, with many muscle groups contributing (both those focused on during interventions, and those not) with individual technique varying considerably among participants. Therefore the results analysed may have been a consequence of either incorrect technique (not focusing on knee flexion/ squat depth) or the inhibition of muscles needed to produce the power in the jump. Sherriff (2010) concluded that releasing the iliotibial band with Emmett technique should result in better squat technique by muscles such as Vastus medialis being more strongly recruited while iliotibial band no longer restricts movement. Unfortunately the findings analysed are unable to support this. Sherriff does however mention that gluteus maximus restriction may also restrict good squat technique; this muscle was not treated during this study and different results may have been produced for the vertical jump test had this been included.

## **CHAPTER FIVE- Conclusions & Recommendations**

### **Discussion/Conclusion:**

With the iliotibial band being recorded as the second most common site of overuse injury, and the most common cause of lateral knee pain in runners (Fredericson et al 2002, Fairclough et al 2006, Taunton et al 2002), and the demands of running being involved in so many field sports, and functional activities; it is imperative to avoid injury by overuse. It was claimed in chapter 2 that similar areas of restriction would be present among the participants due to the demands of their position. This suggestion has been supported in Chapter 3 (table 3.2), with only a 2.4° range recorded between all participants pre-test ROM.

Providing myofascial release techniques requires a relatively short time to administer and no preparation time. Though determining which intervention to administer requires considering some basic elements such as equipment, time, and skills for effective treatment. Emmett technique requires no equipment to purchase in order to administer the intervention, though this technique does require training on the part of the therapist so it can be performed as a safe, effective intervention. On the other hand, foam rolling may require more time to be effective and requires the purchase of a foam roller but the techniques are easy to perform and the intervention does not require additional training. The convenience of self myofascial release and reduced cost over time when compared to availing of the services offered by a therapist may outweigh the initial disadvantages mentioned above. The feel of the roller and the intensity of the self-massage work must be properly geared to the age and fitness level of the user though.

Although the Emmett technique appears to be effective for myofascial release of the iliotibial band, identifying and eliminating the reasons for the restriction is important for future management. For example, Fredericson & Wolf (2005) cite studies that demonstrate an inhibition of the lateral gluteus as causality of iliotibial band injuries. A strengthening of these weak or inhibited muscles, while stretching the possible tight opposing muscles (antagonist) could help complement a therapy programme by muscle re-education.

Questions remain as to how and why manual therapies work and who responds best. Effects are difficult to quantify because they seem to vary from person to person and much depends on the talent and experience of the therapist (for Emmett Technique), or the equipment used (for SMR). That is not to say the outcomes cannot be evaluated and compared with controls treated in some other way, however, the therapist or equipment cannot be excluded from the process. For the issues highlighted in the limitation section below, Kidd (2009) argues that myofascial release will never be evidence based.

**Study limitations:**

The results of the present study must be considered in the context of several limitations. First, the practice of using the ITB as independent entities raised two potentially problematic possibilities:

The techniques involved treating the tensor fascia lata, sartorius, and vastus lateralis muscles as well as the iliotibial band. “When tense, the vastus lateralis muscle could contribute to the tension of the iliotibial tract.” Bevilaqua-Grossi et al (2004, p.51)

Secondly the Emmett technique performed during this study differs from usual clinical practice, where a personalised variety of technique combinations is determined following assessment. This study required identical treatment routines with controlled variables, to enable comparison. It is therefore unknown if results would have differed by adopting a normal clinical approach.

It was not specified to participants whether shoes were to be on or off when performing vertical jump test. Some participants performed test with shoes on, others performed wearing only socks. As this was not standardised, it is not possible to rule out as an influence on technique and consequently the results. Another critical detail to be addressed is that although all participants received the same verbal instruction and demonstration, execution of the squat varied greatly among participants as correct technique was not emphasised and reinforced during the participant’s execution. This may help to account for the insignificance between vertical jump heights pre and post intervention, as discussed in chapter 4.

Pre training testing would have been preferred but unachievable due to time restrictions. Although this allowed tissues to be warmed up (extensibility of soft tissues enhanced), unfortunately the demands of training may have accumulated fatigue in muscles required for vertical jump test. Guidelines suggest: “Perform the vertical jump when well rested to ensure your best performance” [www.livestrong.com/article/164577](http://www.livestrong.com/article/164577)

## **Recommendations**

To ensure reliability of results any further studies in this area should include a much larger sample size. It must be understood that the findings may only be applicable to the population under investigation and the effects on elite athletes is unknown. The repeated measurements of fitness variables in players can be heavily influenced by participation rates that are compromised by injuries, match commitments, and general player availability. This is a common difficulty where the objectives of the researcher are of secondary importance to the professional team.

As the iliotibial band is also common site for cycling overuse injuries (Fairclough et al 2006) a study on symptomatic cyclists may highlight effectiveness of myofascial release more liberally from a different stance.

A single treatment of Emmett technique demonstrated immediate significant increases in the flexibility of the lateral thigh, though an extended time period of treatments (perhaps one week apart for four weeks) may have a more lasting or noticeable effect. Or in the case of Hanten et al (2000), a home program study could be conducted analysing Emmett technique as it uses simple techniques that can easily be taught in a clinical setting.

Including a stretching element to compliment the myofascial release techniques used in this study may produce more significant results as a combination of stretching and myofascial release have been documented (Hanten et al 2000, Dawn et al 2010) as having greater improvements than one versus the other.

## **REFERENCES**

Baker, R.L., Souza, R.B., Fredericson, M. (2011) 'Iliotibial Band Syndrome: Soft Tissue and Biomechanical Factors in Evaluation Treatment.' 3 (6), pp. 550-561

Barnes, M.F. (1997) 'The Basic Science of Myofascial Release: Morphological Change In Connective Tissue.' *Journal of Bodywork & Movement Therapies*. 1 (4), pp. 231-238

Bevilaqua-Grossi, D., Monteiro-Pedro, V., Da Cunha Souda, G., Silva, Z., Berzin, F. (2004) 'Contribution To The Anatomical Study of The Oblique Portion of The Vatus Lateralis

Muscle.’ *Brazilian Journal of Morphological Sciences*, 21 (1) pp. 47-52 (Online) available at [www.jms.org.br](http://www.jms.org.br) (Accessed 3/1/12)

Chaitow, L. & Walker DeLany (2002). *Clinical Application of Neuromuscular Techniques. Vol.2: The Lower Body*, Elsevier Ltd.

Clark, M., Lucett, S., Corn, R (2008). *NASM Essentials of Personal Fitness Training. Third Edition*. Lipincott, Williams & Wilkins.

Cubick, E.E., Quezada, V.Y., Schumer, A.D., Davis, C.D. (2011) ‘Sustained Release Myofascial Release As A Treatment For Patients With Complications of Rheumatoid Arthritis & Collagenous Colitis: A Case Report.’ *International Journal of Therapeutic Massage Bodywork*, 4 (3) pp.1-9

Curran, P.F., Fiore, R.D., Crisco, J.J. (2008) ‘A Comparison of The Pressure Exerted on Soft Tissue By Two Myofascial Rollers.’ *Journal of Sports Rehabilitation*, 17 (4), pp. 432-442

Dallalana, R.J., Brooks, J.H., Kemp, S.P., Williams, A.M. (2007) ‘Epidemiology of Knee Injuries in English Professional Rugby Union.’ *American Journal of Sports Medicine*, 35 (5) pp. 818-830 (Online) available at <http://ajs.sagepub.com/content/35/5/818> (Accessed 22/3/12)

Dodd, J.G., Good, M.M., Nguyen, T.L., Grigg, A.L., Batia, L.M., Standley, P.R. (2006) 'In Vitro Biophysical Strain Model For Understanding Mechanisms of Osteopathic Manipulative Treatment.' *Journal of the American Osteopathic Association*, 106 (3), pp.157-166

Earls, J. & Myers, T. (2010). *Fascial Release for Structural Balance*. Lotus Publishing

Ercole, B., Antonio, S., Day, J.A., Stecco, C. (2010) 'How much Time Is Required To Modify A Fascial Fibrosis?' *Journal of Bodywork & Movement Therapies*, 14 (4), pp. 318-325

[www.fasciacongress.org/2009](http://www.fasciacongress.org/2009) (Accessed 16/01/12)

Findley, T.W. & Schleip, R. (eds.) (2007) *Fascia Research. Basic Science & Implications for Conventional & Complementary Health Care*. Elsevier GmbH

Fredericson, M., Wolf, C. (2005) 'Iliotibial Band Syndrome In Runners: Innovations In Treatment. *Sports Medicine*, 35 (5) 451-459 (Online) available at [www.ncbi.nlm.nih.gov/pmc/articles](http://www.ncbi.nlm.nih.gov/pmc/articles) (Accessed 23/11/11)

Ge, H-Y., Fernandez-de-las-Penas, C., Yue, S-W. (2011) 'Myofascial Trigger Points: spontaneous Electrical Activity and Its Consequences for Pain Induction and Propagation.'

*Chinese Medicine*, 6 (13) (Online) available at [www.ncbi.nlm.nih.gov/pmc/articles](http://www.ncbi.nlm.nih.gov/pmc/articles) (Accessed 30/11/11)

Gracovetsky, S.A. 2010 'Range of normality vs range of motion: a functional measure for the prevention and mgnt of lower back injury.' *Journal of bodywork and mvt therapies*, 14 (1), pp.40-49:

Gray, H. (1995). *Gray's Anatomy*. Parragon Ltd.

Hall, S (1995). *Basic Biomechanics*. Second Edition. Mosby-Year Book Inc

Hanten,W.P., Olson, S.L., Butts, N.L., Nowicki, A.L. (2000) 'Effectiveness of a Home Program of Ischemic Pressure Followed by Sustained Stretch for Treatment of Myofascial Trigger Points. *Journal of the American Physical Therapy Association*. 80 (10), pp.997-1003 (Online) available at <http://ptjournal.apta.org> (Accessed 02/03/12)

Hidalgo-Lozano, A.,Fernandez-de-las-Penas, C., Diaz-Rodriguez, L.,Gonzalez-Ingesias, J., Palacios-Cena, D., Arroyo-Morales, M. (2011) 'Changes In Pain & Pressure Pain Sensitivity After Manual Treatment of Active Trigger Points In Patients With Unilateral Shoulder Impingement: A Case series.' *Journal of Bodywork & Movement Therapies*. 15 (4), pp.399-404

Hinz, B. (2006) 'Masters and Servants of The Force: The Role of Matrix Adhesions in Myofibroblast Force Perception and Transmission.' *European Journal of Cell Biology*. 85 (3), pp. 175-181

Jarmey C. (2008). *The Concise Book of Muscles. Second Edition*. Lotus Publishing.

Jones, I., Gratton, C. (2003). *Research Methods for Sports Studies*. Routledge Publishing

Kain, J., Martorello, P.T., Swanson, E. Segó, S. (2011) 'Comparison of An Indirect Tri-Planar Myofascial Release (MFR) Technique and A Hot Pack For Increasing Range of Motion.' *Journal of Bodywork & Movement Therapies*, 15 (1), pp.63-67

Karageanes, S.J. (2005). *Principles of Manual Sports Medicine*. Lippincott Williams & Wilkins

Kidd, R. (2009) 'Why myofascial Release Will Never Be Evidence Based.' *International Musculoskeletal Medicine*. 31 (2), pp. 55-56

Liptan, G.L (2010) 'Fascia: A Missing Link In Our Understanding of The Pathology of Fibromyalgia.' *Journal of Bodywork & Movement Therapies*. 14 (1), pp.3-12

Marr, M., Baker, J., Lambon, N., Perry, J. (2011) 'The Effects of The Bowen Technique On Hamstring Flexibility Over Time: A Randomised Controlled Trial. *Journal of Bodywork & Movement Therapies*. 15 (3), pp.281-290

Maud, P.J., Foster, C. (eds) (1995). *Physiological Assessment of Human Fitness*. Human Kinetics

Mc Ardle, W.D., Katch, F.I. & Katch, V.L. (2006). *Essentials of Exercise Physiology, Volume 1. Third Edition*. Lippincott Williams & Wilkins

Meltzer, K.R., Thanh, V., Cao, T.V., Schad, J.F., Kind, H., Stoll, S.D. and Standley, P.R. (2010) 'In Virto Modeling of Repetitive Motion Injury and Myofascial Release.' *Journal of Bodywork & Movement Therapies*. 14 (2), pp. 162-171.

[www.myofascialrelease.com](http://www.myofascialrelease.com) (Accessed 24/11/11)

[www.nasm.org](http://www.nasm.org) (Accessed 30/03/12)

Nelson MT (2008) Get Off The Foam Roller. Available at [www.dieselcrew.com/articles](http://www.dieselcrew.com/articles) (Accessed 24/11/11)

Norris, C.M. (2004). *The Complete Guide To Stretching*. Second Edition. A & C Black Publishing.

Palastanga, N., Field, D. & Soames, R. (2006). *Anatomy & Human Movement: structure & function. Fifth edition*. Elsevier Ltd.

Premlumar, K. (2004) *The Massage Connection: Anatomy & Physiology. Second Edition*. Lippincott Williams & Wilkins

Robertson M (2008) Self-Myofascial Release: Purpose, Methods & Techniques. Available at [www.robertsontrainingsystems.com](http://www.robertsontrainingsystems.com) (Accessed 27/09/11)

[www.rossemmett.com.au](http://www.rossemmett.com.au) (Accessed 27/09/11)

Schleip, R., Klingler, W. & Lehmann-Horn, F. (2005) 'Active Fascial Contractility: Fascia may be able to contract in a smooth muscle-like manner and thereby influence musculoskeletal dynamics.' *Medical Hypothesis*, 65 (2), pp. 273-277

Schultz, R.L. & Feitis, R. (1996). *The Endless Web, Fascial Anatomy & Physical Reality*. North Atlantic Books

Seeley, R. Stephens, T. Tate, P. (2000) *Anatomy & Physiology. Fifth Edition.* Mc Graw-Hill Companied Inc.

Sheriff P (2011) Improving an Athlete's Balance, Power, Flexibility & Well-Being with the Emmett Technique. Available at [www.rossemmett.com](http://www.rossemmett.com) (Accessed 24/11/11)

Simmonds , N., Miller, P., Gemmell,. H. (2010) 'A Theoretical Framework for The Role of Fascia in Manual Therapy.' *Journal of Bodywork & Movement Therapies.* (Online) available at [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov) (Accessed 18/01/12)

Simons, D.G. (2002) 'Understanding Effective Treatments of Myofascial Trigger Points.' *Journal of bodywork & Movement Therapies*, 6 (2), pp. 81-88

[www.smiweb.org/roller.pdf](http://www.smiweb.org/roller.pdf) (Accessed 14/4/12)

[www.sportsinjuryclinic.net](http://www.sportsinjuryclinic.net) (Accessed 22/03/12)

Taunton, J.E., Ryan, M.B., Clement, D.B., McKenzie, D.C., Lloyd-Smith, D.R., Zumbo, B.D (2002) 'A Retrospective Case-Control Analysis of 2002 Running Injuries.' *British Journal of Sports Medicine.* 36 (2) pp.95-101 (Online) available at

<http://bjsm.bmj.com.queens.ezpl.qub.ac.uk/content/36/2/95.full> (Accessed 28/11/11)

[www.thebowentechnique.com](http://www.thebowentechnique.com) (Accessed 21/01/12)

Tozzi, P.,Bongiorno, D.,Vitturini, C. (2011) 'Fascial Release Effects On Patients With Non-Specific Cervical or Lumbar Pain.' *Journal of bodywork & Movement Therapies*, 15 (4), pp. 405-416

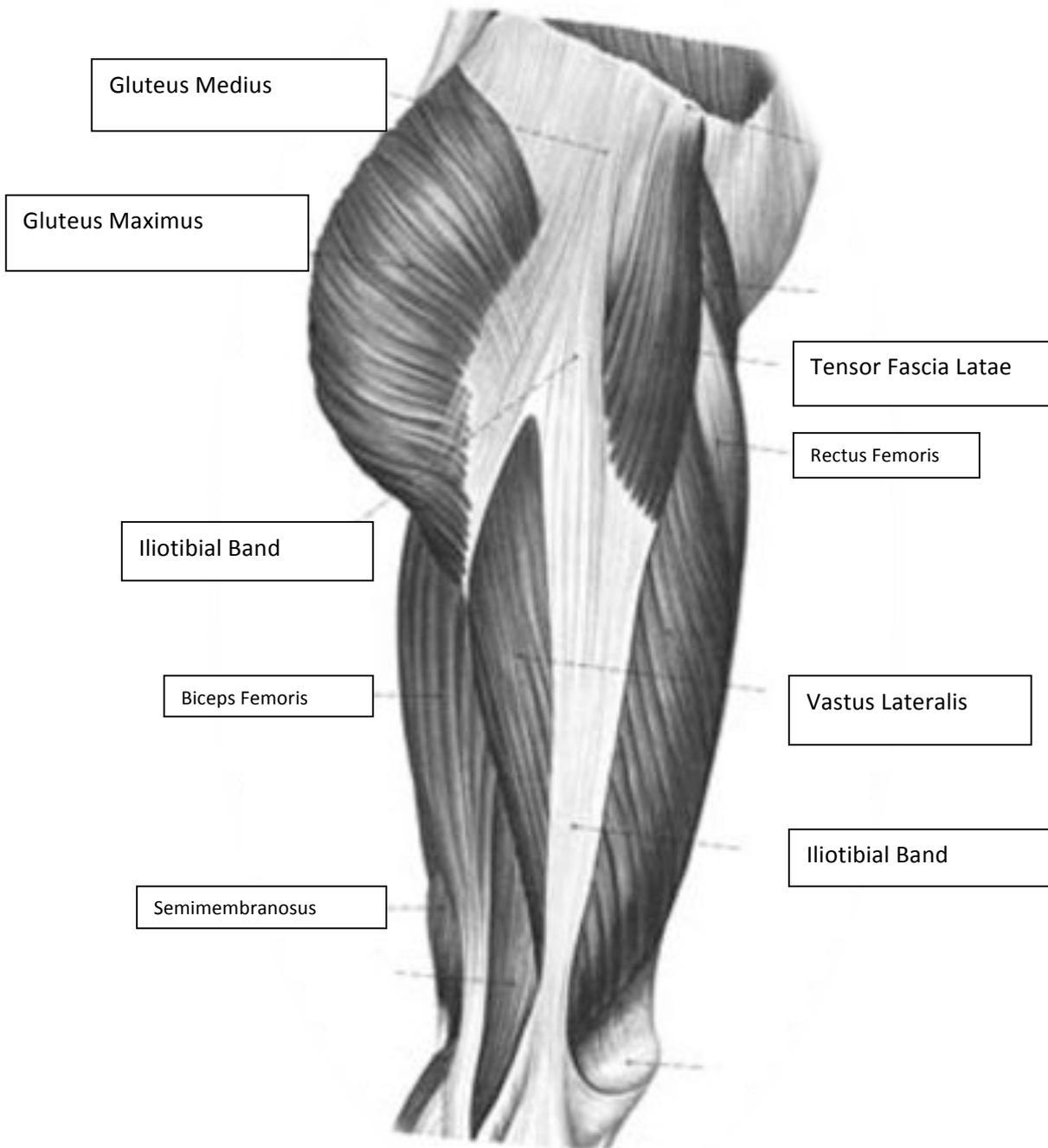
[www.verticaljumping.com](http://www.verticaljumping.com) (Accessed on 03/04/12)

[www.visionfit.co.uk](http://www.visionfit.co.uk) (Accessed 12/12/11)

Worthington, H.V., Holloway, P.J. (1997) 'Making Sense of the Statistics.' *International journal of Health Education*, 35 (3), pp.76-80

Zarins, B., Adams, M. (1988) 'Knee Injuries in Sports.' *New England Journal Medicine*, 318 pp. 950-961 (online) available at [www.nejm.org/doi/full/10.1056/NEJM198804143181504](http://www.nejm.org/doi/full/10.1056/NEJM198804143181504) (Accessed 22/03/12)

## **APPENDICES**



Source: <http://www.smiweb.org/omt/guides.html>

Appendix 1

# Training Guide

*Always do both sides for best results*

## Leg / Knee Pain (ITB)

### Assessment / Indications

**Assessment** - Numbness down side of leg and into the top of the foot. Tendency to roll ankle. Inside knee pain.

*Standing on 1 leg, bend knee & take across body towards middle* (with moving pelvis)

### Move

#### Move



#### Move

**Point A** - Locate point half way between top of hip and outer thigh bone in muscle. (TFL) (1/2 between ASIS & head of femur) - make - head of femur

**Point B** - Locate point 4 fingers (approx 5cm) up from top of kneecap on the outside side of thigh. (ITB)

Apply gentle direct pressure to both points simultaneously (watch for jump sign). Hold until there is a response or up to 20 seconds. May repeat if necessary.

#### Notes

*Make sure fingers stay horizontal. Don't rotate leg*

© Evetree Pty Ltd 2000

### Cautions/Contraindications

Seek medical advice when appropriate.





# Training Guide

## Knee Flexion (*Sartorius & ITB Release*)

### Assessment /Indications

**Assessment** - Inability to straighten leg, problems with flexion/extension, stiff upper leg area and inability to support weight.

*Get due to squat & assess depth. Get the right foot*

### Move

**Move**



**Move**

**Point B** - Measure half way between the groin and the knee on top of thigh. Find the point on outside thigh level with this measurement (in ITB). *(line up to knee marker ahead)*

**Point A** - Locate point 1 finger width lower than point B and in the sartorius muscle on inner thigh. (use the tigers' mouth measure to find this point). Apply gentle direct pressure to both points simultaneously (be aware of sensitivity on inner thigh point).

Hold until there is a response or up to 20 seconds. May repeat if necessary.

**Notes**

*Do tiger's mouth from point B to get point A.*

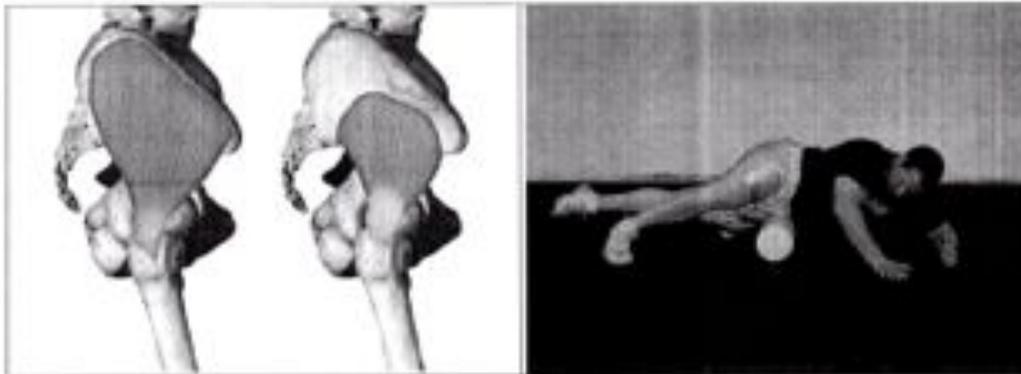
*Keep leg & think of it  
when you pass into knee  
of knee & make  
it into a circle  
like a tiger  
mouth*

### Cautions/Contraindications

Seek medical advice where appropriate.



## TENSOR FASCIA LATAE, ANTERIOR GLUTEUS MEDIUS, AND GLUTEUS MINIMUS



<p><b>Anatomy and Function</b></p>	<ul style="list-style-type: none"> <li>• The anterolateral (front and side) hip musculature is collectively responsible for hip flexion, hip abduction, and hip internal rotation.</li> <li>• All three muscles, the tensor fascia latae (TFL), the anterior gluteus medius, and the gluteus minimus originate from the front/middle of the hip. The gluteus medius and minimus insert onto the greater trochanter (at the top of the femur). The TFL inserts on the fibial band (IT band).</li> </ul>
<p><b>Reasons to Treat</b></p>	<ul style="list-style-type: none"> <li>• The TFL can become overly tight, placing excessive strain on the IT band. This typically results in lateral knee pain.</li> <li>• Excessive tension in the anterolateral hip musculature can cause muscle imbalances around the hip and knee, leaving you exposed to injury.</li> </ul>
<p><b>Set-up</b></p>	<ul style="list-style-type: none"> <li>• Lie on your side on the ground with the roller underneath the front portion of your hip.</li> <li>• Place the same side elbow and the opposite hand/foot on the ground.</li> </ul>
<p><b>Performance</b></p>	<ul style="list-style-type: none"> <li>• From the starting position, press up and roll back and forth over the outside portion of your hip.</li> <li>• To really hit the anterolateral hip musculature, adjust your body toward a face down position.</li> <li>• Roll for 30–60 seconds, and then switch legs.</li> <li>• To increase the pressure, take your opposite leg off the floor.</li> </ul>
<p><b>Alternate Modalities</b></p>	<ul style="list-style-type: none"> <li>• Use a harder roller to increase the pressure.</li> </ul>