Fascial Stretch Therapy™

Ann Frederick Creator of Fascial Stretch Therapy and KMI Certified in Structural Integration

Chris Frederick PT, Creator of Fascial Stretch Therapy and KMI Certified Structural Integration

Foreword by **Thomas W Myers**

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How Fascial Stretch Therapy™ came about

This book is the product of two individual journeys, meeting up and collaborating.

Ann's story

When I was a young girl, I had a premonition that I was destined to create something that would unite art and science. I was unsure what it would be or when it would happen, but I knew it was my calling. I also knew it would change the way people looked at the topic and that it would eventually spread worldwide. When it occurred, the development of FST felt like a combination of divine guidance and pure necessity.

FST has been a blessing beyond words. People may question why I would want to teach a technique I had developed and lose the exclusivity of being the only person to offer it. My response has always been that when we are given a gift it is our responsibility to give back. How could I not share something that has brought so much joy and hope to myself and so many others?

From age of four until I was 40, I spent my life in a dance studio. I was both dancing professionally and teaching from the young age of 14. Movement and the wonder of the body have been a part of my daily life for a very long time. My other passion was the science of the human body. I took every course offered on the subject in school and read as much as I could about it. In high school, I distinctly remember going home and learning all 206 bones in one evening.

I spent many years training dancers in flexibility and not one was ever injured on my watch. I attributed it to the focus in my classes on extensive flexibility training to which I dedicated at least 30 minutes during the warm-up component in each class. In the dance world, extreme flexibility along with strength is a non-negotiable requirement.

While teaching a group stretch class at a local gym, I had an epiphany. I looked out over my class, which was filled to capacity, and realized that there was a great need in people to become more flexible, indeed senior citizens made a big chunk of the class. This new awareness of the general population needing and, more importantly, wanting help with their flexibility was eye opening and very exciting. My vision was becoming clearer once I enrolled at Arizona State University (ASU), getting my degree and studying academic dance with a focus in kinesiology.

As life would have it, at the end of one of my first stretch classes, a guy came up to me and said, "They need what you are doing here at the ASU athletic department."

It was an opportunity to work with college athletes from 26 different sports.

The journey of creating Fascial Stretch Therapy began in the summer of 1995 in the weight training room at ASU. It occurred on the bench press when I tied a weight belt around a football player's leg to hold it still while I stretched him. I realized that if I could get proper leverage on this big guy by getting him up off the floor and using a stabilizing strap, I was truly on to something. And the rest, as they say, is history. Each time I had someone on the treatment table in my private practice, I developed the new method a bit more. Between my studies and my private practice I was working upwards of 18 hours a day. I was on the football field in the morning taking the team through group stretches or in the weight room working with individual athletes. I worked for several hours before class and then again after class each afternoon. I would then go to my office and spend time honing the art of my newfound career. It was not unusual for me to spend ten hours a day stretching individual clients.

My hard work paid off quickly – I was asked to travel with the 1996 US men's Olympic wrestling team. They say if you are living your life's calling, things begin to flow and drop into place and they certainly were! I was the first flexibility specialist to be a part of the Olympic games.

I knew I would need someone to take care of my clients while I was away for the summer so I found two young people who were interested to learn the technique I had developed. I trained them privately and they became the first two FST students as well as my beginning staff. While my company's name started out as A&F Flexibility Systems, we soon changed it to the Stretch to Win Center based in Tempe, Arizona, USA.

I had a thriving practice for almost 20 years and enjoyed working with clients from many walks of life. A large percentage of my clientele were professional American football players. From 2005–2009 I was fortunate enough to be part of three Super Bowls taking care of almost the entire starting lineup for three different teams.

It became increasingly clear that there was a growing need to develop the school and that it was time for me to end the chapter of private practice and give my full attention to teaching others. We closed our office in 2012 to dedicate ourselves to sharing our knowledge of FST with as many as possible. This was accomplished through our professional training school, the Stretch to Win Institute.

The other serendipitous event in my life was to meet Chris, my husband, partner and the love of my life. He has been by my side since the day he walked through my office door in June 1998. Joining creative forces early in FST's genesis allowed Chris and I to evolve and develop the technique together. I choose not to speculate what my life or FST would be like without him.

Chris's story

Joining creative forces with Ann early in FST's genesis allowed us to evolve and develop the technique together. However, due to my background as a physical therapist, I was in the unique position to see what effects FST had on my patients with specific diagnoses and other (according to orthodox medicine)

unidentified conditions. This led me to develop and evolve a set of premises, based on a complex personal heuristic (subjective) and objective analyses, trial and error in combining manual with movement techniques, intuition, specific neuromuscular activation/inhibition techniques, specific connective tissue mobility testing followed by manual movement corrections and more. I came to appreciate the value and benefit of using FST as a stand-alone treatment as well as it being an integrative manual therapy.

The outcome of using FST in my practice proved to be for me a far quicker and more effective way to assess and treat my patients, than what I was doing previously. In contrast, it was far from quick or easy to put the FST method into words, that is, to translate this experience into the form of a book. As you may imagine, trying to explain the art and science of 25 years of clinical practice that comes to bear in even a two-minute assessment for a correct diagnosis that points to the right treatment, proved to be a big challenge. I gladly share with you the foundation of these premises with you, largely in the assessment chapter, which I hope will serve you well as it did me.

It is important for the reader to understand that FST is not just another set of manual techniques. Rather, FST is a comprehensive and logical system that is based on a foundation of our 10 principles that serves as a dependable treatment guide for manual therapists. It is also based on original concepts of therapist guided as well as client active movement such as what we call the StretchWave. It is composed of our own innovative choreography that, to our knowledge, is unlike anything else (putting aside and acknowledging other effective therapies). What makes this system unique from other types of stretching techniques out there? It is active for the client, not just passive. The intent is to re-educate the brain not just render body therapy. It is designed to be a system meant for adapting to the uniqueness of the therapist as well as clients' individual needs. Designed to be gentler on the therapist's body, FST requires very little strength and effort. It is based on the theory of working with finesse and not force and on 'romancing the nervous system' to get the best results. Working together as a team allows the level of trust and relaxation to grow quickly for better outcomes.

It is important to realize that it is also much more than following the exact description in the book to have success, but more important to keep one's body and mind open to the endless possibilities of customizing the instructions in this book to your own way of moving both yourself and your client. After many years of clinical use and teaching the techniques to our students, we have presented in this book the most effective ways to achieve the goals of opening up and freeing the tissues of your clients. The global approach of engaging full systems manipulating the neuromyofascial chains of the body and not isolated muscles, is the theme.

Utilizing FST for almost two decades, both us and our students formed theories about it: what problems it solves best and why; what pairing with other therapies complement or enhance the other, the one or both; how to integrate with other therapies; how and why FST works based on thousands of hours of client responses, solving some of their most vexing, recalcitrant problems. In

fact, a few medical doctors are now writing prescriptions for FST because they have seen evidence of its effectiveness with their patients. The most rewarding aspect of this process has been the hope that has been granted to clients for an improved quality of life when they thought there was none.

It is in the spirit of the hope that FST gives clients that is the impetus for writing this book and sharing our life's work with you. It is our fervent wish that we did a satisfactory job and that you are able to apply the material in this book to make a difference in the lives of your clients.

Ann Frederick

Chris Frederick

November 2013

Foreword

It is a pleasure to see many years of work by my friends Chris and Ann Frederick synthesized into the book you hold in your hands. Of course it is personally gratifying to see the Anatomy Trains map applied in a new and practical way, but I hasten to add that the Fascial Stretch Therapy methodology is all their own.

FST is truly a team effort. Chris's conceptual ingenuity and physiotherapy background blend seamlessly with Ann's intuitively sure feel and 'get 'er done' attitude. Their partnership and dedication to what works has led to a series of stepped methods that allows them (and you) to make progressive and sustained changes in a wide variety of clients, students, or patients.

The academic debate about 'stretching' - as Chris points out early on - is not over, and requires years of several lines of research. Whatever the outcome, you can be sure that the principles and practices laid out here will survive largely intact, for the simple reason that they work in the real world. Forged in the blast furnace of decades of practice with some of the world's best and toughest athletes, you can rely on the tensile strength of the steel at the heart of their FST method.

This book, like its authors, is thorough and well-organized, full of humor yet serious about the goal at hand: reducing pain and getting full and efficient movement out of each and every joint. It stands on its own as a guide to acquaint the practitioner with every aspect of the method and call you to your highest and most attentive work. But I hope it will also serve to bring more professionals to their trainings, where the details of their handling skills can be passed kinesthetically - always the best way to obtain a new manual skill. Meanwhile, this book serves as well as any two-dimensional object can in bringing their four-dimensional work to life.

Thomas Myers

Walpole Maine

March 2014

Introduction

If you haven't already, we strongly recommend that you read the Preface. It was written with the intention to share the initial inspiration and continuing passion that inspired the creation and ongoing evolution of the manual therapy we call Fascial Stretch Therapy (FST). The introduction will give you a better idea of how to use this book in your practice with clients.

Chapter 1: The Great Debate about Stretching

Controversy about stretching began to surface about 14 years ago. Since then many professionals have become either adamantly pro or anti stretching in their philosophies when rendering therapy or training. Chapter 1 goes some distance to clear the air as to why this dilemma has occurred and takes a more balanced approach rather than a polarized all or nothing stance.

Negative as well as positive outcomes in scientific research about stretching are presented. A new definition of flexibility is presented that expands the meaning beyond mere range of motion (ROM), as traditionalists have defined it. This facilitates understanding how stretching fits into the context of therapy and training.

Human form and function is explained with evidence from scientific research – that our cells are indeed biotensegrity structures. Biotensegrity structures are, by definition, flexible structurally and physiologically from an atomic level to cells and macro tissues. FST uses this support and more for evidence on how to assess and treat the body but from a different (yet still integrative) perspective than other manual therapies.

Myofascial tone and tension are defined and the effects of stretching on proprioceptors and interoreceptors are explored. Finally, the FST model of assessment and treatment is introduced for the following chapters.

Chapter 2: Fascial Stretch Therapy Dissected

FST is based on ten foundational principles that are described in detail in this chapter. Since there is much therapist-client movement, the choreography required to successfully perform FST and guidelines for best client outcomes are outlined in these principles. For example: synchronizing breathing with movement, tuning the nervous system to the needs of the client, following a logical anatomical order, achieving range of motion gains without pain, mobilizing before stretching, stretch neuromyofascia not just muscle, use multiple planes of movement, target the entire joint, get maximal lengthening with traction, facilitate neurological reflexes for optimal results and adjust stretching to individual client goals and requirements.

Finally contraindications and indications for FST are listed.

Chapter 3: Comparisons and Contrasts

In this chapter comparisons with related assisted and/or manual stretching techniques and methods are explored. A general overview of other methods and stretching techniques is included so they can be compared and contrasted with FST.

Chapter 4: Assessment

The information in this chapter is based on and supported by the thousands of clients that were evaluated and treated when we operated our FST clinic for 20 years. It is also based on feedback from the thousands of professionals we trained that are now using FST assessment and treatment methods.

The topic of assessment in manual therapy is complex and even controversial as different groups now polarize themselves by siding only with evidenced based peers and training. We take a more balanced approach, accepting the need for ongoing evidence in research but also acknowledging the value and benefits of disciplined clinical experience.

To make this topic initially more easily accessible, manual assessment techniques are conveniently grouped as LSS – Lengthening, Shortening or Stabilizing regions for rapid feedback of efficacy and direction in treatment.

Assessment theory is progressed with SITTT – Scan, Identify, Treat, Test, Treat again which introduces a quick method to derive a differential working diagnosis and subsequent treatment. This method will save you time when forming a working hypothesis that will quickly be proven or defeated so that you will have enough time to develop other hypotheses that you can test for efficacy, all within a single session. The flow from global to local and static to dynamic assessments and treatments will logically progress through Posture, Myofascia, Joint and Nerve protocols. Chapter Four also covers functional, weight bearing positions of assessments and quick tests of mini-treatments to table based, more specific assessments and treatments.

Chapters 5 and 6: FST – Lower Body and Upper Body

The last two chapters of the book are the most practical in the sense that the foundation of the training is provided in a detailed, step-by-step method. You will have the flexibility to design a session based on your client's needs. Some examples follow to give you an idea of the wide spectrum of treatment that FST addresses, that is physical, mental, emotional and even spiritual:

- A full body therapy
  - Joint, nerve and myofascial decompression
  - Trigger point release
  - Balances fascial chains to achieve normal levels of elastic-stiffness
  - Relaxation
  - Decreases mental stress
  - Changes mental outlook from negative to positive
  - Improved physiology, for example, sleep, digestion, energy
- Up-regulate the nervous system for pre-activity dynamic warm-up, corrective work and/or mental-emotional athletic preparation.

- Down regulate the nervous system for post activity restoration, regeneration and lymph flush.
- Regional manual therapy to:
  - Increase ROM
  - Increase strength
  - Improve balance
  - Modulate pain
  - Decrease edema
  - Mobilize the central and/or peripheral nervous system
  - Improve posture
  - Correct structural imbalances, for example, leg length discrepancies

The above list is not exhaustive but serves to illustrate that FST has the capacity to treat the whole person, depending on the skills and intuition of the therapist. FST has stood the test of time and is growing exponentially with therapists and trainers integrating it into their respective practices. We invite you to do the same.

1 The Great Debate about Stretching

Introduction

The great controversy about stretching, particularly in therapy and athletics, started about 14 years ago (Shrier, 1999). Previously, it was assumed that stretching improved overall functional and athletic performance, increased specific flexibility and reduced injuries. A majority of clinicians and therapists as well as trainers and coaches from all disciplines were convinced about the importance of stretching as a necessary part of their protocols for successful outcomes.

An article titled *The Stretching Debate* (Chaitow, 2003) featured invited commentary on research, that was largely negative, on the benefits of stretching (Herbert & Gabriel, 2002).

Many of these opinions, most of them by recognized manual therapists, were emotionally charged and reflected the conflicts between what therapists believed worked for them and what the researchers were saying was really happening in stretching. Since then, adamant pro and anti stretch camps have formed within professions practicing varietal therapies including fitness and sports coaches. This acrimonious climate has been taken advantage of in the media, adding more fuel to the fire (Reynolds, 2013). Consequently, we feel it is extremely important to bring awareness to these facts and hopefully enlighten you by presenting a balanced perspective to explain the topic of stretching and all that it implies.

To toot our horn, if we may, it is felt that we are somewhat qualified to assist in the illumination of stretching in general and misconceptions about stretching in particular because, unlike most practitioners and therapists, we have done research and put it into clinical practice. We are blessed to have made a very good living using FST as a stand-alone service on clients every day for almost 20 years. Since 1999 we have been training others how to quickly, efficiently and completely improve outcomes in pain management and functional performance. The feedback from our students has exceeded our expectations; hence we were inspired to write this book so that therapists and their clients may also benefit from our knowledge of FST.

By reading this chapter, you will be more informed when discussing stretching with clients and other professionals. We also hope that the information will help you to develop a new appreciation for the extraordinary potential of stretching beyond increasing range of motion and that will help you to practically apply the method.

Negative outcomes in research

Injuries

In August 2002, an article appeared in *The British Medical Journal* that created a great deal of interest and controversy. The paper in question (Herbert & Gabriel, 2002) was a systematic review of research that evaluated the benefits (or lack of benefits) associated with stretching procedures in relation to protection from injury and post exercise soreness. Conclusions taken directly from the study were "Stretching before or after exercising does not confer protection from muscle soreness. Stretching before exercising does not seem to confer a practically useful reduction in the risk of injury, but the generality of this finding needs testing." (Herbert & Gabriel, 2002).

Six years after that study, another similar systematic review seemed to confirm the conclusions of the former. Namely, "There is moderate to strong evidence that routine application of static stretching does not reduce overall injury rates". But there was an additional finding in that study that cast doubt on the concluding statement being taken at its word as a reliable and valid guide for using stretching in preventative therapy and training: "There is preliminary evidence, however, that static stretching may reduce musculotendinous injuries" (Small, 2008).

Strength, power and speed

There are many studies that demonstrate overall decreased parameters for strength such that many trainers and coaches do not allow stretching before weight training and other strength focused activities (Babault, 2010; Sekir, 2010, Manoel, 2008).

With regards to both power and speed, a study about the effects of stretching on sprinting is a good representation of what other studies have found. A repeated measures design was used, which consisted of the same group of 25 healthy, recreational runners completing a 40 yard sprint trial immediately following each of four different stretching conditions aimed at the iliopsoas muscle and lasting one minute each. In the no stretch condition, subjects improved significantly from pre- to post-sprint times. However there were no statistically significant differences in pre- and post-stretch sprint times among the static, ballistic and dynamic stretching conditions. The study concluded that sprint performance may show greatest improvement without stretching and through the use of a generalized warmup with walking as the activity. Obviously, these findings have clinically meaningful implications for runners who include iliopsoas muscle stretching as a component of their warm-up before running. For the record, similar negative results have been observed with various kinds of jumping (Behm, 2007).

The studies discussed above are several examples of negative outcomes with some studies even suggesting in their conclusions that stretching not be performed as a therapeutic or training guideline. Taking a look at positive outcomes in stretch research may help to form a balanced opinion and approach using science to inform our practice.

Positive outcomes in research

In one study, authors found three positive results from stretching: "(i) there was steady-state force enhancement following stretch in voluntarily contracted muscles; (ii) some force enhancement persisted following relaxation of the muscle; and (iii) force enhancement, for some stretch conditions, exceeded the maximum isometric force at optimal muscle length" (Lee & Herzog, 2002). This study counterpoints other studies concluding that stretching weakens force production in muscle and suggests further study to see how stretching may actually enhance muscle force production.

A recent systematic review on multiple studies indicated the following positive outcomes from stretching (Page, 2012).

- Increased ROM.
- ROM increases bilaterally from unilateral stretch.
- Static and dynamic warm-ups are equally effective at increasing ROM prior to exercise.
- Pre-contraction stretching (e.g. PNF) lowers excitability of muscle.
- A pre-stretch contraction has been associated with greater acute gains in ROM compared to static stretching in many studies.
- In contrast to static stretching, dynamic stretching is not associated with strength or performance deficits.
- Dynamic stretching improved dynamometer-measured power as well as jumping and running performance.
- Static stretching performed before or after warm-up does not decrease strength.
- Four repetitions of 15-second holds of static stretching did not affect vertical jump.

Stretching tissues and cells

Cyclical mechanical stretching of fascia has demonstrated morphological changes in gene expression and protein synthesis that affects both intracellular as well as the extracellular matrix (Wang et al., 2009; Chen et al., 2008; Upton et al., 2006; Coutinho et al., 2006; Wang et al., 2004). It is not clear that therapeutic stretching lasts long enough to initiate these effects, but sufficient repetition of a stretch may produce such an effect (Standley et al., 2009).

Univacuolar adipocytes are abundant in areolar connective tissue and where fascial tissues are engaged in shear and sliding motions. Recent discoveries show that they have endocrine functions including estrogen, peptides and cytokines and the important cytokine transforming growth factor. Humeral factors are transmitted to and from adipocytes via the bloodstream (Schleip, 2012). Could it be that targeted fascial stretching, which creates shearing and sliding forces, provides stimulation to the endocrine function, where it has been deficient in cases of fascial patho-stiffening, scars, injury and other conditions? Specific client responses make it seem plausible.

There are currently studies showing that mechanical tissue stretching can induce nuclear remodeling in connective tissue fibroblasts and that stretching induces cytoskeletal remodeling within minutes, which contributes to

connective tissue tension (Langevin et al, 2010). Tissue stretch has been shown to increase collagen and transforming growth factor 1 (TGF-ß1), yet currently very little is known about loose connective tissue's biomechanical behavior (Langevin et al 2011, 2008, 2003). However, there is growing compelling evidence that connective tissue functions as a body wide mechanosensitive-signaling network (Langevin, 2006).

Getting perspective on studies about stretching

There are many examples of a number of ubiquitous problems we see in research on stretching. In our view, one of the big problems in this and in many studies is that the word "stretching" is not adequately defined. Even after reviewing individual studies, the majority are only moderately specific about the type of stretching studied, for example most often "static" stretching. In the conclusions, it gets much worse as the general term "stretching" is used without qualifying it with a descriptor term, for example "static" (Thacker et al., 2004). The problem occurs when only the conclusions and not the details of studies like this are read (as is often the case), and the wrong impression is promoted. That is, all stretching is this or that when it should more accurately state, for example, "static stretching that utilizes the specific parameters used in this study is this or that". We believe that this is one major source of misinformation about stretching in the news, other media and in professional journals that is prevalent.

It should be noted that much of the negative outcomes of studies on stretching over the past ten years has come from static stretch research (McHugh & Cosgrave, 2010). It should also be noted that the majority of stretch studies have attempted to isolate the stretch to one accessible muscle, most often the hamstrings (Slavko, 2013). "Static" and "the hamstrings" are obviously only two of a multitude of variables that can be studied and controlled in stretching research. Unfortunately, those are the two most common variables seen in research of stretching human tissue. Many other clinically relevant variables that can be applied in stretch therapy remain largely unstudied (Page, 2012). For example, we have never seen a study that attempts to compare or differentiate any type of stretching applied to tonic versus phasic muscles. Therefore much of the negative press about stretching and the concomitant advice that has recently arisen from fitness and therapeutic sources appear to be limited at best and potentially harmful at worst. We see much of this advice being derived from narrow, evidenced-based studies and not from systematic reviews comparing multiple methods or approaches to clinical assisted stretching much less self stretching.

What may be an even bigger problem with using outcomes of research studies to guide clinical practice is disturbing evidence that has recently come to light. As reported in a Wall Street Journal article, "most results, including those that appear in top-flight peer-reviewed journals, can't be reproduced" (Naik, 2011). Bruce Alberts, editor of Science magazine was quoted in that same article: "It's a very serious and disturbing issue because it obviously misleads people who implicitly trust findings published in a respected peer-reviewed journal". As a result, he had that journal devote a large chunk of one of its issues to the problem of scientific replication (Jasny, 2011). The point to be made here is that the results of scientific studies can be viewed with respected suspicion just as

much as anecdotal report from a trusted colleague or mentor. One is not better or necessarily more accurate and certainly not more trustworthy than the other, if one is to believe the multiple sources that have recently exposed the fallibility of the scientific method.

With this being the case, if a clinician wants to use evidenced-based protocols in stretching, we advise following the recommendations of study outcomes only to the specific degree they were derived. That is, it should not be assumed by the therapist that the outcomes are also valid, using one example, for muscles and/or other tissues not studied in research. Unfortunately, incorrect and potentially harmful assumptions and generalizations (and therefore incorrect advice) about stretching still abound in all fields.

We agree with a 2012 clinical commentary that discussed current concepts of muscle stretching interventions and summarized the evidence related to stretching as used in both exercise and rehabilitation (Page, 2012). Noting both negative and positive outcomes from stretching as we just did, the article stated that several authors observed individual responses to stretching. For example, the effectiveness of type of stretching seems to be related to age and sex: men and older adults under 65 years responded better to contract-relax stretching, while women and older adults over 65 benefit more from static stretching. Another one: 60-second holds of static stretches were associated with greater improvements in hamstring flexibility in older adults compared to shorter duration holds. Growing studies like this suggest that stretching programs may need to be individualized for best outcomes. It has been our observation in practice that this is indeed the case and that standard protocols in stretching and flexibility training are mediocre at best and harmful at worst.

Practical, reliable professional experience from one's personal practice integrated with input from experienced colleagues or mentors, when needed, which is then informed by evidence in research, is the best strategy for optimal client outcomes. It is important to note that while science is moving steadily forward in research of connective tissues and is producing findings that can be clinically very supportive of stretching used in different kinds of manual therapies, practical parameters for a broad range of clinical application sadly lag far behind. The many possibilities of multiple types of stretching combined with the application of multifarious parameters have yet to be studied. Some or even many of these may well yield positive outcomes. Practice-based evidence (along with credible backing from fascia research) has certainly produced many positive outcomes with stretching. We need both reliable and valid clinical anecdotes as well as good research for best outcomes with our clients. However it also helps to adequately define what we are studying, namely: flexibility and stretching.

New definitions

Flexibility

We will start by defining a more comprehensive meaning of the word "flexibility" as a means to better define the even more misunderstood word "stretching". Even Michael Alter, author of *The Science of Flexibility* stated in his seminal book, "Little agreement can be found on the definition of so-called

normal flexibility." (2004). Perhaps due to this lack of agreement, many in our related professions are using the simplest meaning: range of motion. There is currently much confusion about the appropriate meaning and application of the word "flexibility" in the medical, allied health, fitness and sports professions, so it is important to try to clarify these terms.

The late prolific sport scientist and athlete, Mel Siff, PhD, stated in his book *Supertraining*: "Flexibility, whatever people mean by that term, differs from joint to joint, displays different properties under dynamic versus static conditions, and concerns not only muscles but all components of the musculoskeletal system, as well as the various types of stretch reflex in the neuromuscular control circuits of the body." (2000).

Dr. Siff wrote that while being able to perform the splits has long been a "supreme indicator of flexibility", he observed that it was quite common for toe touchers and splitters to be "quite unable to sit on their haunches in a low squat position with heels flat on the ground" (2000). If that is the case, it would seem that we immediately need to abandon "capable of doing the splits" (and anything else that is similar) as a frame of reference for adequate flexibility. This would include the familiar "sit and reach" test, still used as a measure of flexibility in the NFL Combines and many other professional sport settings (the NFL is the professional American National Football League try-outs for collegiate and other athletes). In any event, this test for flexibility certainly needs to be discarded as a singular test or measure for one's total or general state of flexibility.

To keep meanings as simple as possible, we prefer and encourage the use of the following online Merriam-Webster definition of flexible: "characterized by a ready capability to adapt to new, different, or changing requirements" (2013). This definition connotes a frame of reference that characterizes any successful organism in nature and science, i.e. adaptability. Though seemingly harsh, we'll never forget Coach Beverly Kearney's words to her multiple national championship winning women's track teams at the University of Texas when we worked with those amazing fast twitch athletes, "Adapt or die!". A fan of Charles Darwin, no doubt!

If we are to accept that flexibility is adaptability, then as applied to generic human abilities to survive, function and thrive, we need sufficient amounts of agility, strength, power, mobility, balance and speed. We also need adequate emotional stability, extensive mental capacity and sharp focus. Being adaptable to a variety of psycho-social-cultural circumstances within our family unit as well as in the broader society, is yet another requirement for successful function and the achievement of a high quality of life. We simply couldn't adapt to a lot of what life throws at us if flexibility referred simply to ROM, as the traditional definition implies. So the question begs, is stretching a means to gaining, regulating and maintaining flexibility in light of its new definition of adaptability? That is, can stretching make us more agile, strong and mobile, perhaps even quicker? Taken even further, does stretching give us the flexibility needed, not only for normal activities of daily living (ADLs), but also to meet the special mental, emotional and physical demands called for in severe challenges like extreme fitness competitions or more importantly in emergency life threatening situations? If stretching is a means to gain all this, is it the best, most efficient way?

Another question is: can stretching eliminate, reduce or otherwise have beneficial effects on pain? If so, what kind of pain specifically can it treat? And by extension, what conditions and/or diseases indicate it as a prime or adjunctive treatment?

Forty years of combined experience has proven to us that FST is an innovative, uniquely rapid-acting manual therapy system, indicated for use in treating pain, many common medical conditions and some diseases. When integrated with an individual's activities to meet specific goals, FST will unequivocally help him or her achieve and maintain flexibility and adaptability for optimal function in life and in sports. In the sections that follow we have aimed to underpin our claims with science, research and experience.

Form and function

It is generally accepted that our body structure or "form" is interwoven and interdependent with our physiological functions. Therefore if we accept that our organ of form is connective tissue or fascia which houses all of our tissues which make up all the functioning organs and systems, we need to understand the nature and behavior of the physical structures within us that foster proper neurochemical pathways from those that foster altered, potentially pathological ones. As manual therapists it is pertinent for us to know what our hands can do physically to manifest beneficial outcomes for our clients and how our touch can influence function and the form of the body.

Tensegrity

In my previous career as an architectural draftsman, I learned that there are unique structures in architecture and engineering that are by definition more flexible than others. One of the earliest examples of this is the geodesic dome design of genius engineer and architect Buckminster Fuller (Fuller, 2013). Dome structures easily adapt to predictable and unpredictable forces, more or less, depending on the materials used (Fuller, 2013). An example would be a dome tent.

Figure 1.1
Geodesic dome tent

When assembled, this structure maintains what is called in engineering "pre-stress" or "pre-tension", that is, a balanced distribution of forces across the entirety through each structural member. Pre-tension of each structural

member as an individual unit is carefully calibrated during manufacturing, so that when they are connected to other members to form a dome, it can properly withstand a range of external and internal forces. The combination of members that adapt to compressive forces with those that adapt to tensional forces gave rise to the moniker "tensegrity" as in "tension-integrity". It is this tensegrity or balanced pre-tension that allows the structure to successfully attenuate forces of gravity, vibration, wind, etc. without damaging the structure. That is why most effective extreme weather tents used by mountaineers and the military are all made from some variation of a dome design. As is our body.

Evidence our cells are biotensegrity structures

There is now plenty of substantiated evidence to confirm that all human cells are indeed biotensegrity structures (Ingber, 1998). For instance, note the highly triangulated "actin geodome" that uses a geodesic form of tensegrity architecture in Figure 1.2.

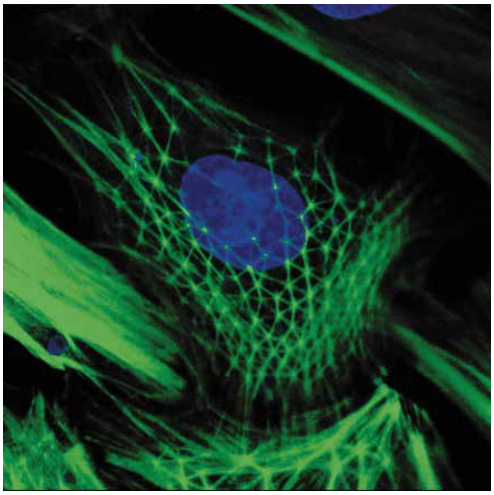

Figure 1.2
The cytoskeleton of a neonatal fibroblast stained to visualize actin microfilaments and DNA, respectively, within nuclei. (With permission from Dr. Emilia Entcheva.)

As the pre-eminent researcher in this field, Ingber states: "An astoundingly wide variety of natural systems, including carbon atoms, water molecules, proteins, viruses, cells, tissues and even humans and other living creatures, are constructed using a common form of architecture known as tensegrity. The term refers to a system that stabilizes itself mechanically because of the way in which tensional and compressive forces are distributed and balanced within the structure." (1998).

The following three important points bear repeating and reflection:

- Biotensegrity architecture is universal in nature
- Biotensegrity structures in nature self assemble and self stabilize
- Biotensegrity structures are by definition flexible for survival

If we can accept that all human cells are biotensegrity structures and by extension, the human body is one and the same, then the varied properties of our structure should obey the "laws of biotensegrity". For the purposes of this book and to keep this complex topic as simple as possible, we will restrict the laws to a few biotensegrity principles set forth by leading researcher Ingber.

The following important rules should be remembered, as they will be referred to later:

- The human body is in a constant, dynamic state of structural and functional self-assembly, from the atomic level to molecules to cells, tissues, organs and systems.
- When small molecular components are combined into some larger functioning unit – such as a cell or tissue – utterly new and unpredictable properties emerge, including the ability to move, to change shape and to grow (i.e. they must be flexible to function).
- Biotensegrity structures stabilize themselves through a phenomenon known as prestress These counteracting forces of tension and compression, which equilibrate throughout the structure, are what enable it to stabilize itself (Ingber, 1998).

Keeping the above points in mind while reading the rest of this book will help you to understand how to successfully assess, treat and train your clients with FST.

Flexibility and stability of the prestressed body

Prestress (also known as pre-tension) appears to be a prerequisite for physiological homeostasis if the whole system, in this case the human body, is to function with structural stability as well as flexibility. In one example, to illustrate this concept, it has been determined that an isolated muscle removed from the body passively shrinks about 10% of its original length (Garamvolgyi, 1971). Therefore this lends additional support to the fact that muscles that are intact (in situ) are always normally under tension at rest, that is, they are in a constant state of prestress or pre-tension. Conceivably that would mean that muscles will also normally resist further lengthening or stretch, whether imposed by the person as a self stretch or by a therapist as an assisted stretch. Yet, when the body as biotensegrity falls out of balance, whatever the reason, the rules of tensegrity physics state that the imbalance must be distributed into regions of increased and decreased tension and compression to dissipate and attenuate the concentration of excessive forces. Some body regions of neuromyofasciae become too stable (excessive compression) while others become too flexible (excessive tension). Joints that are the connecting points for the compressive boney elements of our tensegrity structure become hypomobile, hypermobile or a combination of both with mal-aligned motion. This allows us to continue to function with some amount of stability and flexibility, albeit in a more compromised state that deteriorates our form and our quality of life.

The task is to correctly assess the regions under compression that need stretching apart from regions under tension that need slackening. Stretching indiscriminately will over lengthen regions of tension with the result of increased tissue damage and pain. Undoubtedly numerous outcomes of stretching tissues wrongly has created some of the negative press that we all hear about. Some of these outcomes occurred because of the following chosen examples of therapist mistakes in thought and action:

1. The regional tissue feels tight, therefore needs to be stretched.
2. The client complains and points to where they think they need to be stretched.

3. A referral source indicates the client needs specific regions stretched, for example, the hamstrings.
4. The client appears to be systemically tight so general stretching is commenced.

In the first case, the stretching may not work fully, partially or at all because the upstream, downstream, medial to lateral and superficial to deep layers have not been assessed. The therapist still practices isolated assessment, isolated treatment, based on isolated anatomy, which is inaccurate, ineffective, and the antithesis of a biotensegrity approach. The second case is a classic example of not combining an effective, objective assessment with the subjective complaints of a client to form a more accurate strategy of addressing signs and symptoms. The third case may be the result of following a prescription based on the assessment of another professional who has seen the client. Instead of conducting one's own assessment in this situation, one assumes the thoroughness and accuracy of another therapist and discounts the fact that time has passed since the evaluation and the client's condition may have changed for the better or worse. Lastly, the fourth case may be accurate in assessment yet stretching may not give lasting benefit because the therapist did not assess the client's prestress status as a common source of chronic hypertonic activation of entire chains of muscles. This scenario is discussed in the next section on muscle tone and tension. In any event, it is easy to imagine that the wrong impression about stretching is fostered when the above-mentioned four (out of many) client scenarios occur often due to a lack of proper assessment of flexibility. Chapter 4 will cover FST assessment in detail.

From the examples just noted and from what has been stated about biotensegrity, we postulate that any negative change in what should be a "normal" or steady state of prestress will lead to structural and functional instability. How this manifests, whether with pain and/or functional deficits, will greatly vary with the individual, and will also be influenced more or less by the condition of their other states: physiologically, mentally, emotionally and even spiritually. Keeping these things in mind, we now examine the property of muscle and fascia tone or tension as a basic condition of prestress in human biotensegrity.

Myofascial tone and tension

To keep things simple, an excellent example of assessing prestress in the body, is to note the client's static (at rest, both in upright and recumbent positions) and dynamic (movement initiated, with and without load challenges) myofascial tone, also called "tension". However, even if we stick only with the word "tone", it may still mean different things to different people, practitioners and professions. An online medical dictionary defines tonus as "a state of partial contraction that is characteristic of normal muscle, is maintained at least in part by a continuous bombardment of motor impulses originating reflexly, and serves to maintain body posture" (Merriam-Webster, 2013).

For example, until we re-educated a client that he was bearing more weight on the balls of his feet in standing, which was his functional working position everyday, his entire posterior chain of myofasciae was overly activated and most likely contributing to his chronic, debilitating symptoms of post concussion

syndrome as well as his chronic low back pain (Myers, 2014). In his first session with us we corrected his posture such that his prestress status of systemic hypertonicity immediately decreased. He simultaneously felt pressure release from his head and low back, among several other positive symptoms. Needless to say, assisted and self-stretching was then much easier to perform with longer lasting benefits within a few sessions.

We add the definition of researchers Simons and Mense: "muscle tension (tone) is an intermediate between muscle contraction that is beyond voluntary control (spasm) and viscoelastic tension that shows no EMG activity" (1998). They also say that muscle tone depends on two physiological factors, one passive and one active:

1. Basic viscoelastic properties of the soft tissue associated with the muscle that was just discussed and/or
2. Degree of activation of the muscle's contractile apparatus.

However, it is only recently that research has begun to provide theories to help us understand the resting tone of muscles. Despite this, the actual origin of muscle tone devoid of action potentials remains a mystery (Simons & Mense, 1998). It makes one wonder how accurate research on treatment effects on muscle tone can be when resting tone is still a scientific mystery. Perhaps much of therapeutic effects on tone are related to the manual stimulation of the superficial, loose layer of connective tissue between the skin and the epimysium. There are now strong, new hypotheses that connective tissue also functions as a body wide mechanosensitive signaling network that is responsible for an array of some of the most important physiological functions of the body. This signaling for function is catalyzed by and responsive to mechanical forces like stretching (Langevin, 2012, 2006; Oschman, 2012).

Despite the mystery of resting muscle tone, researchers recognize three provisional sources of unintentional muscle activity (tension or tone):

1. Psychological distress or anxiety
2. Overload from sustained contraction or repetitive activity
3. Inefficient or untrained use of muscles (Simons & Mense, 1998).

However we may assess tone or tension, the presence of either a systemic or regional hyper or hypotonicity issue at rest, much less with activity, is a challenge to the stability of a client's biotensegrity. Therefore what is indicated is a treatment that can up regulate hypotonus or down regulate hypertonus FST appears to regulate tonus as indicated in as little as one maneuver for local disorders or one 30–60 minute session for systemic ones. This is why it is often the treatment of choice to effect change in many disorders rapidly, easily and efficiently. When the client experiences such a rapid change in how they feel and function when re-assessed, then other supportive treatments or even active physical training can follow sooner for a faster, permanent resolution of many common client problems.

While points may have been made about how stretching can be indicated and does work as a first course of treatment despite the controversy, we now return to the cell for other scientific examples that support therapeutic stretching. Since cells make up tissues, and tissues make up organs with organs making up systems, if we take a look at the structural flexibility of a cell, we can

probably make some extrapolations about how our body is formed and how it functions. However it should always be kept in mind that the form and function of systems is much more complex than simply the summation or totality of individual cell units.

Cells do the twist

In 1993, Ingber and Wang (the biotensegrity researchers) made cells do the twist. They found that when they increased the stress or tension applied to integrins (molecules that go through the cell's membrane and link the extracellular matrix to the internal cytoskeleton), the cells responded by becoming stiffer and stiffer, just as whole tissues do. Furthermore, living cells could be made stiff or loose by varying the prestress/pre-tension in the cytoskeleton by changing, for example, the tension in contractile microfilaments. Bearing in mind, this was observed without neural input or output, thus occurring solely as a physical, biomechanical effect. Naturally, more studies are needed to understand the additional effects of neural modulation in vivo.

We want to make an important point here, especially to manual therapists and those that refer clients and patients to them. This and other studies have established that the structural tension of the cytoskeleton of living cells – in effect, the cell's connective tissue – can be manually manipulated to either loosen or tighten (Langevin, 2011). And these effects can occur outside of nervous system intervention. This point will be added to other relevant points later on in this chapter, to underpin and hopefully support the premise of FST with science and research.

In the meantime, here are some pertinent questions that therapists may ask when thinking about how to use the conclusions from this study:

- Can hypermobile or lax tissues in a person be made stiffer to add stability where needed and/or made looser where hypomobile or immobile?
- What manual therapy techniques if any, can therapeutically adjust the tension of cellular cytoskeleton, such that specific tissues, that are, for example, pathologically tight, can be targeted?
- Is assisted stretching used as a manual therapy technique more, less or just as effective as anything else to enable therapeutic changes to take effect?

While more research is needed to substantiate evidence that can guide us on these clinical matters, this book will provide plenty of answers in the form of clinical experience and practice-based evidence to guide you in the successful implementation of assisted stretching, in particular, FST. Here follows, another fascinating, related study about how stretching reversed injury in cells.

Stretching heals injured cells

Starting with a human fibroblast cell that was subjected to repetitive strain, Dr. Paul Standley et al created a study that attempted to simulate myofascial release as a "therapy" for the injured cell. When we heard Dr. Standley describe this study at the 2nd Fascia Research Congress, he stated that he used specific osteopathic therapeutic parameters of clinical stretching used in myofascial release but applied to cells. This study clearly demonstrated that stretching

of the cell reversed apoptosis (cell death) that was previously induced by simulating clinical repetitive strain injury (Standley, 2010). It suggested that the effect of stretching the matrix of the connective tissue cells themselves, which then react to the mechanical signal with a functional change, might in turn affect a remodeling change on the matrix itself. These changes are not normally neurologically mediated, and are therefore direct mechanobiological effects (Standley, 2010; Howard, 2009; Ingber, 1998). So if therapeutic remodeling of the cytoskeleton, in effect, the fascia of the cell, can change both it's chemistry (function) and it's structure (form) for the better, without brain or neural influence, isn't it likely that it can be done with groups of cells that form tissues and systems? Researcher Ingber states: "any movement from within a life form or without drives physiological processes" (1998).

Effects of stretching on proprioceptors and interoreceptors

Kinesthesia is defined as "a sense mediated by end organs located in muscles, tendons, and joints and stimulated by bodily movements and tensions; also sensory experience derived from this sense" (Merriam-Webster, 2013). The end organs of kinesthesia are sensory mechanoreceptors, that is, nerve endings that relay afferent information via movement. There are ten times as many sensory receptors in fascial tissues as there are in muscle and unmyelinated free nerve endings outnumber the familiar myelinated ones (spindles, GTOs, Paccinis, Ruffinis) by five to one (Stillwell, 1957; Myers, 2011). These are some substantiated reasons why FST is more fascial-based in intention rather than isolated muscle based.

The actual desire to move, to yawn and stretch (called in this specific case, "pandiculation") and even to exercise after being immobile is likely to begin as autonomic sensory input. Other unmyelinated free nerve endings called interoceptors communicate to the brain certain physiological conditions of the body (mentioned shortly below) which produce motivational responses that are related to the homeostatic needs of the body. Interoceptors in those same tissues far outnumber proprioceptors by a factor of seven to one. The majority function as mechanoreceptors, responsive to mechanical tension/stretching, pressure or shear forces. While about 60% are high threshold receptors, the rest are low threshold, responsive to very light touch (Schleip, 2012).

A more significant and newer finding is that information from the interoceptors activates the insula (or insular) cortex and not the primary somatosensory cortex, which is usually activated by proprioceptive input. The insula cortex has the following functions, perceptions and/or interpretations: interoceptive awareness (subjective sense of the inner body, negative past emotional events, blood pressure before and after exercise coupled with subjective sense of effort being expended, pain intensity, imagined pain linked to painful events, warmth/cold intensity, vestibular sensations); motor control (eye/hand coordination, motor learning); homeostasis (autonomic and immune system regulation); bodily self awareness and self consciousness; social emotions generated from smells and sights real and imagined; emotions (considered a limbic related cortex). It is interesting to note that one study using magnetic resonance imaging found that the right anterior insula was significantly thicker in people who meditate (Schleip, 2012; Lazar et al., 2005).

Some interoceptive nerve endings in muscle tissue have been classified as ergo receptors; they inform the insula about the workload of local mm. Their stimulation has led to changes in sympathetic output, which increases blood flow. Stimulation of other interoreceptors resulted in increased matrix hydration (Schleip, 2012).

With global FST, clients report rapid kinesthetic improvements, often within one session. These improvements include: the feeling that active movement is resistance free and easier to perform; clients feel more connected to their bodies and that their entire body has responded favorably to the work. Re-assessment with functional tests objectively confirms their subjective statements of improvement.

FST clients also commonly report many of the sensations noted about interoception previously, most notable being strong feelings of: lightness, freedom, lack of resistance, no weight, no pain, strong and fast (athletes), warmth, blood flow, good tingle, buzz, drunk, euphoric, giddy, full bladder. Outward signs are varied and individual but include: smiling, crying, laughter, dancing, actively and spontaneously swinging hips, jumping, shaking head with disbelief in how they feel, hugging after treatment, flushed face. These post treatment manifestations appear to be supportive of interoceptive stimulation from FST.

The important point to be made here is that mechanical stimuli like stretching and other movements are necessary to enable proper function of our kinesthetic sense through improving proprioception and interoception.

FST model of assessment and treatment

Assessment and treatment is described in more detail in Chapters 4, 5 and 6. We believe FST works fast and effectively as a therapy due to the following:

- Parasympathetic response is immediately facilitated
- Pain is avoided
- Protective neural response is avoided
- Client gives up control and removes most, if not all, barriers to trust.

Here we will use chronic non-specific low back pain as an example of how FST is implemented after the parasympathetic response is facilitated:

- Systemic decompression with a focus on hypomobile joints in the entire spine, pelvis and hips.
- Lengthening neuromyofasciae that is hypertonic (over activated; facilitated) proximal and distal from the site of complaint.
- Facilitating/activating neuromyofasciae that is hypotonic secondary to inhibition of their antagonists and other factors.
- Post treatment functional re-education on how to stand, sit and move into/out of functional patterns peculiar to the client.

The FST treatment above has been described in very general terms to give you an idea of order and flow, to allow this discussion to proceed before details are described in later chapters.

Summary

As stated at the beginning of this chapter, a fair amount of clinical outcomes cited in studies of stretching over the past 10 years have been negative, i.e. stretching does not reduce injuries, may promote injuries, decreases power, decreases strength, etc. More recently there have been studies demonstrating the opposite – that stretching reduces injuries, increases power and strength, etc. This has resulted in debates, controversy and confusion in professionals, in the public they serve, and the media as to whether stretching should or should not be included in treatment and/or training.

Hopefully we have expanded on the topic of stretching and thus clarified the frames of reference for research as well as for discussion. We offered a new definition of flexibility to clarify the role of stretching as one's means among many to foster adaptability in clients. Positive outcomes in research to balance negative have been provided to inspire a more balanced perspective on the potential benefits of using stretching on your clients. And finally, there should be recognition beyond what exists in many circles today, that stretching is a topic that is both quite broad and deep. Broad in that there is a wide spectrum of parameters – intensity, duration, frequency – that can vary respectively from gentle to strong, short to long and low repetitions to high repetitions based on individual requirements. The topic of stretching is also deep, as it affects structure and function from within the cell to the surface of the skin and everything in between.

Most of all we hope you have been inspired by our passion and dedication to the topic of flexibility and stretching and recognize that it is so much more than just range of motion. The following chapters are dedicated to sharing our combined four decades of work and experience with you in detail, so you may have more success with your clients.

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A. General Assessment

1. Major observations

Goal: To look at the client from the overall perspective.
To assess the client's body before beginning a session.
Client position: Supine and relaxed on table. Arms are down, alongside the client's body.
Therapist: Standing at the foot of the table.

2. Hip clearance move

Goal: To ensure the client is aligned correctly on the table.
To assess the passive flexion of lumbar spine, pelvis and hips.
Client position: Supine
Therapist:

- Grasp the heels and lift both of the client's legs off the table.
- Bend both knees toward their chest, then straighten out the legs and slowly bring them back down to the table.
- Make sure client remains relaxed and does not help you as you return to starting position.
- Reason for move: Eradicates false positive leg length discrepancies (LLD) due to poor positioning on table.

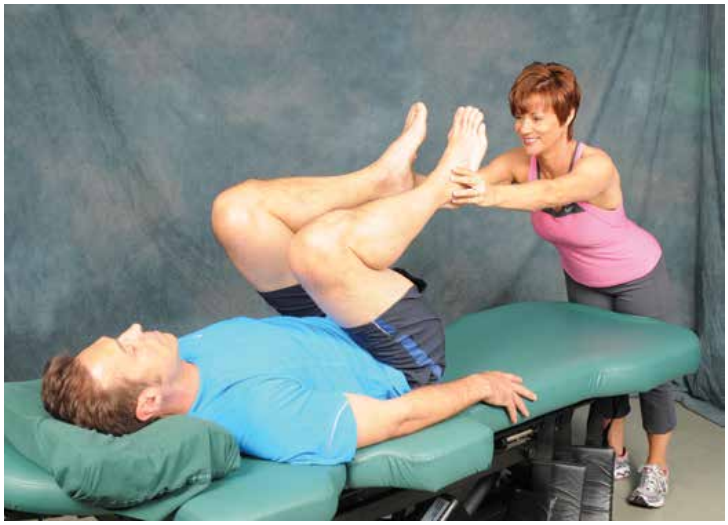

Figure 5.1a
Hip clearance

3. Leg length check

Goal: To check bilateral medial malleoli for LLD.
Client position: Supine with arms down at their sides.
Therapist:

- Standing at the foot of the table.
- Place your thumbs under medial malleoli edges, resting other fingers on feet.
- Look straight down to check leg length and compare.
- Frequently the short leg is the dominant leg, especially in athletes.

Figure 5.1b
Leg length check

4. Double leg traction

Goal: To feel for tension and restrictions throughout client's entire fascial net.
Client Position: Supine and relaxed with arms at their sides.
Breath: Both the client and therapist inhale to prepare for the movement and then exhale into the movement together.

Figure 5.1c
Double leg traction

Therapist:

- Hold both heels in the palms of your hands and gently wrap your fingers around the rest of the feet.
- Lift both of the client's extended legs with traction at 10°–20° hip flexion.
- Engage your core and bend your knees slightly.
- Lean back with your body, stay relaxed.
- Where do you feel the client's tension and/or lack of tissue yield/elasticity?

Traction: Through both legs.

5. Single leg traction

Goal: To assess the hip joint capsule by performing moderate traction until slight elastic give is felt in the tissue. To find their specific "sweet spot" which is the optimal open joint position for traction. To decompress joint and create more space.

Client position: Supine and relaxed with arms at their sides.

Therapist: Standing at the foot of the table.

- Position client's leg approximately 20° flexion and abduction; with a slight external rotation of the femur.
- Hold their heel with one hand and wrap your other hand around the top of their foot. If this hand position does not feel secure to you, or client's ankle is hypermobile and/or painful, try another variation by wrapping both hands around the malleoli and above the ankle joint (not shown).

Traction: Relax your own body. Lean back with your body to achieve the traction. Do not pull with your arms; rather let your body do the work.

Repeat traction three times with a bit more force each time, as indicated.

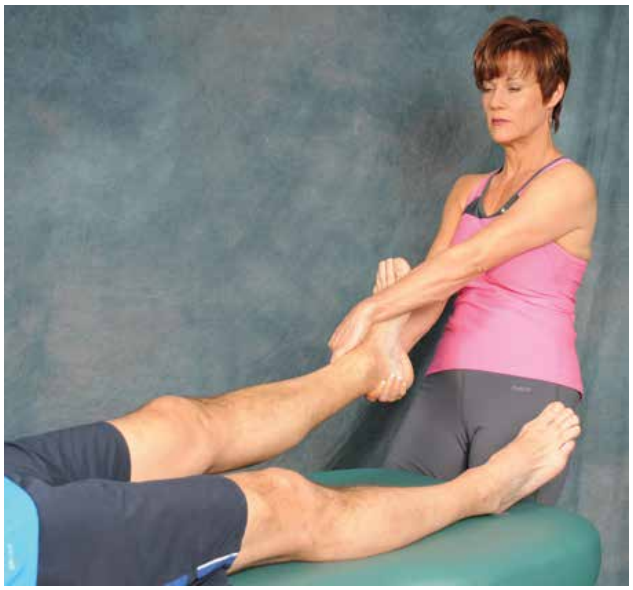

Figure 5.1d
Single leg traction

IMPORTANT NOTES

1. Do not pull, yank or try to "pop" the hip. If the hip spontaneously manipulates during traction, do not repeat this specific traction again.
2. Do not try to manipulate the other hip (unless you are licensed to do so); just repeat same on other side as noted above.
3. Hypermobile and/or painful ankle joints require therapist to anchor hands above the joint or otherwise stabilize it manually.

Hip capsule end feel:
Normal = ±50% elastic give
Hypomobile = < 50%
Hypermobile = > 50%

Repeat: On the other leg.
Oscillate: Both legs before moving on to the lateral line check for relaxation.
Gently move legs in and out of internal and external rotation.
Gently and slightly shake legs up and down.

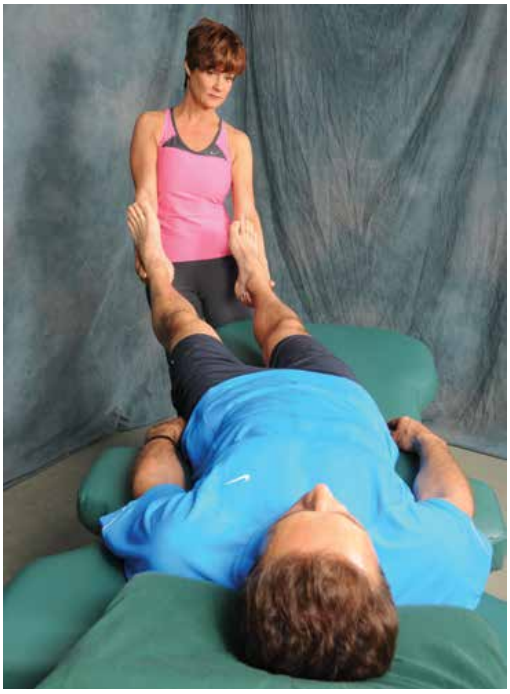

Figure 5.1e
Lateral line check – walking to right

6. Check lateral movement (moving to the therapist's right side)

Goal: To assess the client's ROM on the lateral side of their body and to ascertain where they may be restricted as you move them laterally.
Client position: Supine with arms at their side.
Therapist:

- Lift both of the client's extended legs with traction at 10°–20° again.
- Hold both of their heels in the palms of your hands and gently wrap your fingers around their heels.

- Engage your core and bend your knees slightly.
- Move slowly to the right until the client's movement stops.
- If their hip begins to roll up off the table you have reached the end of their ROM.

Traction: Lean back with your body, stay relaxed.

From the last position

Goal: To increase ROM in lateral lumbopelvic hip region, especially lateral QL, TFL/IT Band and all tissue along the lateral line.

Therapist:

- Place the client's right leg (the bottom one) on your hip or quad as you move to your right.
- Lift their right leg higher, holding at their heel.
- Place your other hand on the outside of the left leg.
- Increase ROM by increasing lateral flexion of their right side.
- Use your body and not your arms to feel the tissue response and end feel.

Traction: Keep tractioning out as you move.

Think of the traction as if you are moving together in an arc away from the table, then up towards the top of the table.

Repeat: On the other side.

Caution: Return to start position if anything like the following occurs: Any sensation of pain or paresthesias which may come from unidentified disc or nerve issues.

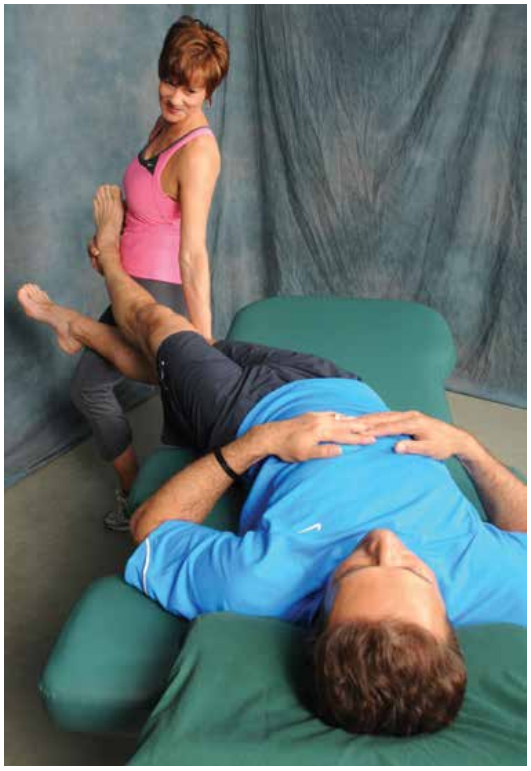

Figure 5.1f
Lateral line with crossed legs

Figure 5.1g
Straight leg raise
(ROM check)

Before you begin stretching, it is important to have a good benchmark for improvement before treatment commences.

Goal: To assess initial ROM for later re-assessment.
Client position: Supine
Therapist:

- Perform a straight leg raise (SLR) PROM to R1.
- Use the heel of your hand to lift the client's leg keeping your fingers relaxed.
- Use your Lats, keep your arm straight to help.

ROM: Make a note of what the ROM is to start off with.
Repeat: On the other leg.

The Anatomy Train Lines will be included in each group of movements in an abbreviated manner

LL	Lateral Line
SPL	Spiral Line
FL	Functional Line
DFL	Deep Front Line
SBL	Superficial Back Line
SFL	Superficial Front Line
SFAL	Superficial Front Arm Line
DFAL	Deep Front Arm Line
SBAL	Superficial Back Arm Line
DBAL	Deep Back Arm Line

B. Range of Motion Evaluation Warm-up and FST-PNF Stretch - Bent leg single joint

Back line and deep front lines

Multiple plane soft tissue ROM evaluation and stretch guidelines:

- Move to **R1 only** for warm-up before moving into stretch.
- **Exhale** into all ROM increases and stretches.
- **Inhale** into all of preparations and PNF contractions.
- Use **gentle traction** throughout ROM and stretches.
- Move in 3°–5° increments as you assess tissue for ROM and stretching.

Figure 5.2
Single leg traction

Goal: To assess the hip joint capsule and perform moderate traction until slight elastic give is felt in the tissue.

To find the client's individual "sweet spot" which is the optimal open joint position for traction.

Client position: Supine and relaxed with arms at their sides.

Therapist: Standing at the foot of the table.

- Position the client's leg approximately 20° flexion and abduction; with a slight external rotation of the femur.
- Hold their calcaneus with one hand and wrap your other hand around the top of their foot. If this hand position does not feel secure to you try another variation.

Traction: Relax your body. Lean back using your body weight to achieve the traction. Do not pull with your arms – let your body do the work.

Figure 5.3
Hand position for therapist for single leg traction

1. Circumduction

Goal: See the six reasons to use circumduction.

TIP

We use circumduction in FST to:

1. Warm-up and thin out synovial fluid in the joint.
2. Assess for impingements in the joint.
3. Check for imbalances in the tissues.
4. See if the client is willing to give up control and allow us to move them.
5. Relaxation.
6. And importantly, to build trust and rapport.

Client position: Supine with their left leg bent 90° at the hip and knee, their ankle resting on your shoulder.

The right leg is now under the straps on the table with two straps above the knee and two below.

Therapist:

- Sit on the same side of the table and place your outside foot firmly on the floor.
- Place your hands on both sides of the client's knee and rest their leg on your shoulder.
- Slide up with your hips and get under their knee with your shoulder.
- Make small slow gentle circles in both directions until you accomplish all six reasons to circumduct noted in the tip box.

Figure 5.4
Circumduction (Up and out)

NOTE
Please note the system of FST was developed around the concept of the client being stabilized with straps for better leverage and control for the therapist. The straps allow a much deeper stretch and facilitate deeper relaxation in the client. If you don't have straps, you will have to modify accordingly: use your other hand to stabilize when possible, use an assistant or have the client perform active stabilization.

Traction: Traction their femur up and out (of hip socket).

Use your body by lifting your torso upward and press your foot into the floor for leverage. Remember it's not your hands doing the work but your entire body!

2. Hip/knee flexion – hamstrings, glutei, lumbosacral – SBL, FL

Goal: Target tissues lying within the SBL, FL: proximal hamstrings, glutei, lumbosacral region; also posterior hip joint capsule; hip flexors lying within the DFL in opposite hip in clients with less mobility.
Client position: Supine with their leg relaxed and resting over your shoulder and on your upper back.

Figure 5.5a
Hip ROM and PNF

Figure 5.5b
Front view