Fascial Stretch Therapy™

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Foreword by Thomas W Myers

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Fascial Stretch Therapy ™

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Foreword by **Thomas W Myers**

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Synchronize your breath with your movement

Tune your nervous system to current conditions

Follow a logical order

Achieve ROM gains without pain

Stretch your fascia, not just your muscle

Use multiple planes of movement

Target the entire joint

Get maximal lengthening with traction

Facilitate body reflexes for optimal results

Adjust stretching to present goals

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

Acknowledgements

First and foremost, we both wish to thank our staff and our clients and patients who came to our clinic, the Stretch to Win Center in Tempe, Arizona, from all over the world. Over the last nearly 20 years your trust and belief in our work has enabled our Stretch to Win team to help you eliminate pain, restore function and give hope when the future offered none. By keeping an open mind to our new and innovative approach to pain management, healthcare, fitness and sports performance, you helped us prove the efficacy of Fascial Stretch Therapy (FST) across a broad spectrum of diseases, dysfunctions, imbalances and athletic deficiencies. Without you, this work would not exist.

A very special thank you to our Institute administrator, Marlene Riggs, to our partner Kevin Darby and to all our instructors and teaching assistants, without whom it would have been impossible to reach as many students and impact their learning experience so tremendously. Your passion, knowledge and desire to make a difference is highly valued and greatly appreciated.

Next, we thank all of our students, now colleagues called Certified Fascial Stretch Therapists and Specialists who believed in us enough to spend their time and money to train in FST. We are thankful for the deep relationships that we have formed with you, such that we are all still in contact for many years after you took our training. This has led to the FST Network, a caring, trusting collaboration of our certified students whose common goal is putting the needs of clients before all else to find lasting solutions to their problems and challenges.

Thank you to Handspring Publishing and to Sarena Wolfaard and Andrew Stevenson, for taking on this project. It has been an honor and pure pleasure to work with the both of you and your team of talent. Many thanks also to the rest of the team including (in no particular order): Katja Abbott for your very fine copyediting, Bruce Hogarth for incredible art and photo layouts and Hilary Brown for your creative marketing efforts.

From Ann: First and foremost, I need to thank God for the divine guidance and inspiration of creating this work.

Words are inadequate for all that he means to me but I would nonetheless like to thank my husband Chris. He raises the bar of expectations and standards for our work together and I am very grateful for all that he brings to our collaboration.

When one is fortunate enough to share their life and dreams with a partner who truly fulfills every aspect of what a soul mate can be, one is a very lucky lady, indeed!

A special thank you to my parents who always supported and encouraged my endeavors. My mother imparted the belief that I could accomplish anything I chose, if I kept my feet firmly planted on the earth and kept my spirit "stretching" up into the heavens. She started my lifetime of movement through the study of dance at the age of four and set into motion the original inspiration for this work. She was also instrumental in developing my love of teaching very early on, as she was my teacher in so many ways.

My father gave me the invaluable mission of creating my own special niche that I was passionate about. He said that I would need to become the very best at it and never stop improving. I will forever be grateful to him for giving me the blueprint for finding true happiness and real fulfillment in my career.

Special thanks to Tim McClellan and Rich Wenner for giving me the opportunity to develop my system at Arizona State University in 1995. A heartfelt, huge thank you to Michael J. Alter, author of the Science of Flexibility for giving me hope and inspiration that an entire new field based on flexibility could be created.

From Chris: It is difficult to express my true gratitude to the love of my life – my wife, partner and co-author of what has been a joy to co-produce. FST has changed my life for the better on so many fronts – personal and professional – and promises so much more for our future and all those we touch.

Thank you to my many early mentors, especially Sifu Sat Hon and Sifu Dr. Mei Chan, who were most instrumental in helping me develop intuition and awareness that guided the evolution of my unique abilities and made me who I am today. A heartfelt thanks to my mentor in manual therapy, Marika Molnar, PT, LAC, who helped me develop on levels much deeper than the physical in her magical dance physical therapy clinic.

Together we thank our mentor, colleague and friend, Thomas Myers. His work of Kinesis Myofascial Integration and Anatomy Trains substantiated and gave a grand dose of credibility to the work that we had been doing with FST all along. Structural Integration and other bodywork methods work so well when combined with FST, such that we see a bright future in the collaboration of this and other effective manual therapies for the mutual benefit of clients and their manual therapists.

Finally we thank all those in the world of fascia research associated with the Fascial Research Congress who have granted us opportunities for mutual collaboration and continue to inspire us with their leadership in this exciting field of science, especially (and in no particular order): Robert Schleip, Leon Chaitow, Thomas Findley and James Oschman.

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.

FST
FASCIAL
STRETCH
THERAPY

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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 Combine 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.

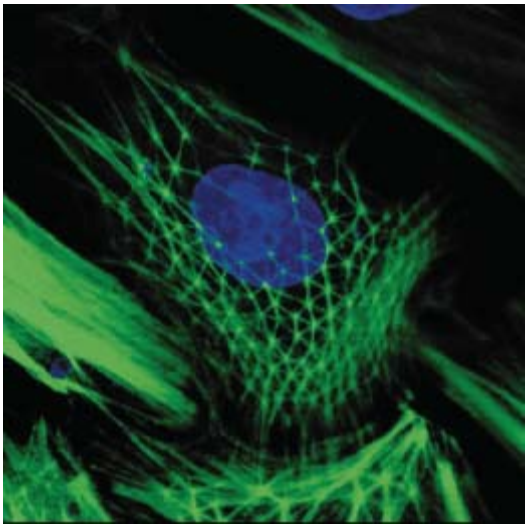

Figure 1.2 The cytoskeleton of a neonatal fibroblast stained to visualize actin microfilaments and DNA, respectively, within nuclei. (With permission from Dr. Emilia Entcheva.)

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 muscles. 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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2

Fascial Stretch Therapy Dissected

Introduction

In this chapter we explain the fundamental concepts of FST. This includes a basic explanation of the system, the principles by which it is guided and the overall philosophy of the system. Once you understand the concepts it will be easier to interpret and apply the techniques in Chapters 5 and 6. Finally contraindications and indications will be discussed.

Ten Fundamental Principles of FST

1. Synchronize breathing with movement
2. Tune nervous system to current needs
3. Follow a logical order
4. Range of motion gains without pain
5. Stretch neuromyofasciae, not just muscle
6. Use multiple planes of movement
7. Target the entire joint
8. Get maximal lengthening with traction
9. Facilitate body reflexes for optimal results
10. Adjust stretching to current goals

While the following principles apply to both the client self-stretching as well as to the therapist/practitioner stretching the client, the emphasis here will be on manually applying stretching in a therapeutic manner. This will help the therapist to better understand how FST may be successfully integrated into his or her practice.

The principles will often refer to "FST sessions" which are commonly anywhere from 15–120 minutes in length. Therefore the Ten Principles will resonate with similar manual therapies set up to treat the whole person within the context of

client-specific problems. They also apply to shorter sessions, much as a quick massage or joint manipulation to one body region works, but obviously on a more condensed level of implementation and application. We will describe the practicalities of using the Ten Principles in short and long sessions when we discuss Technique in Chapter 5.

Finally, whenever we discuss any particular system of the body, we recognize that these systems are artificial divisions that humans use to categorize and aid learning. This division is also part of a reductionist, mechanistic, dissective tradition that is being superseded by progressive, evolving, dynamic systems theories of which fascia science is a participant. It is in the spirit of the progressives that we discuss the following Ten Principles with an additional caveat: simply stated, we recognize that our body functions with complex communication interactions, involving many modulating feedback loops. Please always take this into account when we describe a subset of any interaction within one or more systems.

1. Synchronize breathing with movement

The theory is that pairing breathing with specific FST movements properly (whether we are stretching, mobilizing or resisting) helps regulate:

- Client attitude to being more receptive to therapy
- The nervous system in general
- Neuromyofascial tone and tension in particular.

This not an original theory in the field of manual therapy. Yet while we may take it for granted that cued breathing may always or often be a part of our work with clients, there is more "choreography" with FST than with many other forms of manual therapy and bodywork, as we are constantly and dynamically moving together with the client in specific ways for specific reasons. The way in which we move simultaneously with the client during the session directly and indirectly affects the breathing of both participants, which then affects both persons' muscle tone and tension by way of reciprocal communicating nervous systems.

The movement

Starting with the movement, we describe the choreography of FST with a simple term: the StretchWave™. Originally inspired by the wave-like action of tidal (at rest) breathing, it also describes the synchronous movement of the therapist moving the client's whole body (or part of it), while breathing with the client. The movement technique can be best described as an undulation that varies from micro to macro movements depending on what factors (for example, pain, osteophytes, fear, etc.) are present. The undulation may be up and down, side to side, in and out or a combination of these movements. Movement of the therapist is synchronous with that of the client, thus appearing to mimic what is occurring at a client's joint, muscle, nerve or fascial meridian.

The breathing

All FST movements – passive, actively assisted, resisted – are coordinated with breathing appropriate for the intended state of the nervous system. Slower breathing is paired with slower movements (called the Slow StretchWave) to achieve client goals of regeneration and restoration. Faster breathing is paired with faster movements (the Fast StretchWave) so the client is ready for activity right after the session (for example, at an event like a marathon). Desired states for tissue facilitation or inhibition are partly controlled through breathing cues, as are corrections made to reduce or eliminate paradoxical, accessory or other dysfunctional breathing patterns.

Combining movement and breathing

As the FST session progresses, correct breathing synchronizes the desired movement, just as the desired movement reinforces correct breathing. Also, verbal cues become minimal to no longer necessary, as the client reflexively responds to timely, small manual cues when indicated. However both breathing and movement are also tailored to the client's constitution and mental-emotional state.

For example, clients suffering from chronic pain and/or Post Traumatic Stress Disorder (PTSD) are, in our experience, generally much less stretch tolerant than others. So they are moved in particular ways that nurture a slow, measured, positive response to FST. In contrast, athletes and others with a stronger constitution, are moved in more challenging ways that test all body systems for any traces of less than optimal function and performance. Thus properly applied fascial manipulation through FST stimulates neurophysiological processes that can radically change strength, mobility and attitude within an hour or less.

Beyond getting the client to breathe appropriately – diaphragmatic facilitation, accessory muscle inhibition, or whatever technique is used – this principle forms the foundation on which the rest of the principles are built. Once the therapist and

client learn the favored methods to modulate breathing synchronized with movement, the first, major method to regulate the entire nervous system for FST has been accomplished. If we can influence the nervous system in this manner, then we can accomplish one of the major goals of a manual therapist – to easily and effectively regulate neural and muscle tension and tone in its entirety. This leads to the next principle.

2. Tune nervous system to current needs

Continuing from Principle 1, we begin tuning a client's nervous system by pairing slower breathing with slower movements (called the Slow StretchWave) and pairing faster breathing with faster movements (called the Fast StretchWave). In this way we provide initial, general access to the parasympathetic nervous system (PNS) in the former and to the sympathetic nervous system (SNS) in the latter, to meet the needs of the moment.

Once a client's system is tuned globally then we have a simpler time tuning it locally and can selectively tune the tension and tone of specifically targeted neuromyofascial structures. For example, we can more easily access and manually adjust specific neurological structures that affect function, like particular mechanoreceptors that lie in and between fascial layers of tissue, peripheral nerve entrapments, central and peripheral nerve mobility dysfunctions and much more.

Consider a practical example, taken from our experience: if the therapist is at a triathlon event, the general goal of the client is to be dynamically flexible but strong with all systems ready to fire. The goal is not to achieve plastic, permanent gains in ROM. Standard manual static stretching would be inappropriate yet self-dynamic stretching may be lacking in effectiveness or specificity. It has been our experience that manually performing the Fast StretchWave (described previously) achieves client goals of feeling and being ready to compete or train. We perform a ten minute full body FST session and the client feels strong, alert and confident to engage in prolonged focused physical, mental and emotional activity.

In contrast, if a client presents with a chronic pain/multiple dysfunction condition, then slower breathing and slower movements to stimulate the PNS is desired. As we know, this starts a cascade of desirable responses, high on the list being decreasing tone and tension in targeted neuromyofascial tissues for many clients. Beyond immediate treatment outcomes, we have observed that many clients in this difficult therapy category, i.e. chronic pain, report uninterrupted, normal sleep for the first time in years. We feel that this is one of the major reasons FST has rapid results in helping to break the resistant cycle of some chronic pain conditions and, as a result, helps to open the door to healing.

3. Follow a logical order

Having both had professional careers as dancers and being engaged in advanced-level athletic activities such as gymnastics and martial arts, both authors have years of practical experience in athletic self-stretching as well as professional experience in manual therapeutic stretching with a wide variety of clients.

This background of being movement professionals combined with manual therapy, rehabilitation and personal training has assisted us in developing the following logical anatomical order when addressing the whole body or quadrants thereof:

- Start from the body center of mass (the core), i.e. lumbo-pelvic-hip region.
- Progress distally from body center by going first to shorter neuromyofascial (nerve-muscle-fascia) units or regions.
- Progress to longer neuromyofascial units.
- End with entire neuromyofascial continuities (aka "chains", "lines", or what Thomas Myers calls "myofascial meridians" or "Anatomy Trains") (Myers 2014).
- Re-assess previous local complaints, pain or dysfunction and treat as necessary with local FST integrated with manual therapies as indicated.
- Stabilize joints that have been stretched before going weight bearing.

The order of treatment listed above works best with the following broad client categories:

- Full body treatments or maintenance sessions.
- Chronic specific pain or other complex dysfunctions.
- Chronic non-specific low back or other pain.
- General complaints of spinal and/or extremity stiffness, tightness, non-specific pain.
- Post athletic training/competition recovery, regeneration, restoration.
- PTSD in combination with PTSD-specific therapies.

Sub-acute and other conditions of shorter duration (less than three months) that are relegated to local, singular regions of the body also benefit from an approach that quickly but accurately examines and considers the problem within the context of the totality. However, this is not always practical or possible, so quicker regional approaches to assessment and treatment follow a logical anatomical order and can be found in Chapters 4, 5 and 6.

4. Range of motion gains without pain

Advanced manual therapists should have the confidence and experience to work deeply when necessary, without causing more injury and slowing the healing process. Unfortunately, if a client's opinion counts for anything, stretching for most of them (whether by self or by others) has always caused pain in the past. We take the position that stretching in and of itself should not hurt and if it does, something is wrong. The following list may help point out some possible reasons why pain may be present:

- An acute tear is present and has not been addressed.
- Micro tears from another cause (such as over training) is now macro tearing from stretching too soon before the micro tears have healed.
- Local muscle dysfunction has not been identified and treated before stretching, for example, trigger point, scar tissue.
- Central and/or peripheral nervous system mobility dysfunction or pathology has not been ruled out.
- A hypermobile or unstable joint(s) has/have not been identified.
- Key muscle in a neuromyofascial chain has inhibition weakness with synergistic dominance of another muscle in the chain and causes it to feel tight despite chronic strain. Stretching the wrong muscle perpetuates this cycle and may contribute to future tears in the same muscle, for example, strained hamstring tears due to substituting for weak glutes inhibited by antagonist tight hip flexors.
- Faulty technique in stretching causing:
  - joint impingement, for example, bent knee glute stretch causing anterior hip impingement
  - stretch reflex
  - myofascial tear
  - neurogenic pain, paresthesias, numbness.

If these and other possible reasons are screened and ruled out then stretching to increase range of motion should not be painful.

Note however, that a phenomenon called "stretch tolerance" or "altered stretch perception" (Magnusson, 2001) has laid some claim to fame as being the reason for ROM increases more than changes in extensibility of connective tissue, at least according to some studies cited throughout a scientific text on flexibility (Alter, 2004). Stretch tolerance as defined by some:

- A subject's perception of discomfort or pain.
- Post isometric relaxation noted in muscle energy technique (MET) or Proprioceptive Neuromuscular Facilitation (PNF) may be the same phenomenon

as the effect of lightness felt when we lift weights.
- After effect of increased intrafusal and extrafusal stiffness, both of which may contribute to the lightness illusions caused by thixotropic changes in the muscle spindles.

While some responses to ROM increases from stretching may undoubtedly be due to stretch tolerance, others are clearly due to other reasons. One example being a capsular restriction, once removed, ROM is restored to normal.

Mobilization and TOC

We have found that there is a better response to manually stretching neuromyofasciae if we mobilize tissue first. Mobilization in this context means passively moving the torso, limb or appendage up to but not into the barrier of tissue resistance. When the manual therapist senses a tissue change to that of more ease, then a transition movement to that of encountering the barrier to affect it with stretching is enacted. Clients are also taught to perform self-stretching this way.

Traction-oscillation-circumduction (TOC) before and during mobilization movements are done on the client before assisted stretching for the following reasons:
- increases ROM without stretching
- increases ROM without pain
- improves tolerance to stretch
- helps tune the nervous system to desired state, i.e. PNS vs SNS
- changes tone and tension as indicated.

More details on TOC as used in assessment can be found in Chapter 4 and as used in treatment in Chapters 5 and 6.

5. Stretch neuromyofasciae, not just muscle

We might also re-state this principle as "Stretch all mechanoreceptors, not just spindles and GTOs". Traditional, isolated stretching that also includes traditional PNF contract-relax technique focuses on facilitating GTOs (Golgi tendon organ) and inhibiting spindles to lengthen muscle and increase joint ROM. That might make sense if the most proliferate tissue in our body – fascia – had a majority of mechanoreceptors in the form of GTOs and spindles. The fact is that they only constitute about 20% of our mechanosensory system that feeds our proprioceptive loops. The remaining 80% are in the following forms:
- Free nerve endings
- Ruffini corpuscles (with "spraylike" endings)

- Paciniform corpuscles (with lamellated endings).

As manual therapists, if we are to have a broad and deep effect on all mechanoreceptors in order to correct, re-train or otherwise therapeutically influence kinesthesia and motor patterning, then any stretching (or other manual therapy) that focuses merely on GTOs and spindles is potentially addressing only one fifth of what needs attention. It is also important to note here that there is research to suggest that "decreases in the response amplitude of the Hoffmann and muscle stretch reflexes following a contraction of a stretched muscle are not due to the activation of Golgi tendon organs, as commonly purported, but instead may be due to presynaptic inhibition of the muscle spindle sensory signal" (Chalmers 2004). That research agrees with earlier studies cited above when 'stretch tolerance' was discussed.

Other researchers support a perspective of neurological function in connective tissue, lending solid scientific support by establishing that fascia and its structures play a substantial role in the process of proprioception (Langevin, 2006; Stecco et al., 2007; Benjamin, 2009). Langevin (2006) discusses convincingly that it is likely that the connective tissue continuum of fasciae and fascial structures serves as a body-wide mechanosensitive signaling system with an integrating function analogous to that of the nervous system.

This is in agreement with the principles describing any sound structure of tensegrity that, on a physical level alone, will equitably and reliably transmit and withstand all forces throughout that structure. Ingber's research confirmed that our cells are biotensegrity structures, which act directly and indirectly on cell physiological function (1998, 1993). It stands to reason then, that the human body architecture of hierarchy composed of cells-tissues-organs-systems, would do the same and much more. The more part being, in this case, that the body architecture as neuro-connective tissue, transmits and receives communication from within and without the body, which helps drive all physiological processes.

Mechanoreceptor location

Some fascia researchers like Van der Wal claim that mechanoreceptor location is not as much of a factor in proprioceptive function as how it mechanically connects and transmits communication to other structures (2012).

So even if a mechanoreceptor is not located in a fascial structure, the fact that extrinsic force transmission can be mediated by that fascial structure means that the main stimulus for mechanosensory relay, namely deformation, can still occur. (Deformation defined by Van der Wal is "stretch, compression or squeeze"). If that is true, then it follows that any manual therapy that provides therapeutic deformation to tissue may potentially reach all mechanoreceptors that are

accessible by using a particular technique. The distinct advantage of the FST method is its ability to manipulate entire fascial chains (lines or continuities) simultaneously, which rapidly "clears out" much if not most dysfunction. Residual local recalcitrant problems may then be easily identified and addressed, without wasting time wondering whether one is working on the cause or the effect of a problem.

When the client's function on re-test has improved this suggests that all the mechanoreceptors that lie in that entire fascial line are likely to have been positively influenced by FST. Naturally this is more efficient and rapid acting than trying to manipulate one mechanoreceptor or one muscle at a time. However, our experience shows that the downstream and upstream effects of our global approach allows easier manual adjustment of localized tissue should that still be indicated.

6. Use multiple planes of movement

When we first promoted these principles in 2003, single plane movements in stretching therapy, rehabilitation and fitness training were still buzzing along. Today, it seems that most fields are aware of and implementing triplanar movement principles and techniques. Creative integration with the use of software and application design, clever fitness machines, assistive devises and tools has also aided trainers and therapists in this goal.

Unfortunately, stretching has lagged behind with many therapists still engaging uni-dimensional, limited planes of movement, not to mention using the same parameters of intensity, duration and frequency. If we take the ball and socket hip joint for example, a circumduction movement takes the hip through the full 360 degree rotation that it is capable of, yet most stretching does not take advantage of this. Incorporating a combination of traction, oscillation, circumduction and a large variety of movement patterns with creative use of spirals, diagonals and rotations produces a more effective result.

Another example of using multiple planes is refining a structural correction even further, such as a leg length discrepancy (LLD). While there are a variety of non-anatomical reasons for LLD such as innominate rotations, upslips, etc. let's take a shortened quadratus lumborum muscle that sits in what Myers calls the "Lateral Fascial Line" as one scenario (2014). If one stretches it on the table in a strict coronal plane, one may re-check and possibly get what the therapist deems an "adequate" correction. However, one may take the assessment a little further and investigate what is felt when one adds a flexion component (bringing the leg off and above the table) compared to an extension component to the coronal tension test

(bringing the leg below the table). One may discover that one, two or all of those specific directions or positions yields better outcomes and thus holds more promise for long term correction than a more simple version of the test may provide.

7. Target the entire joint

As we know, the joint capsule is made up of fascia that surrounds the joint and fuses with ligaments that connect bones to each side of the joint. What we don't all know is that some short lateral rotators of the hip attach to the capsule and not to the trochanter or femur as shown in our anatomy books. We know this because we saw it in a cadaver along with many other variations of anatomy that don't fit the pictures we have in our minds from the anatomy books that we studied, rely on and may still refer to. We'll discuss the implications of this a little later.

Our point here is that targeting the joint capsule, as in the hip, is often a major strategy in FST to restore painless function to the spine, hip and lower quadrant, especially when the hip joint is hypomobile to long axis or longitudinal traction. Johns and Wright (1962) determined that muscles provided 41% of the total resistance to movement testing stiffness (elasticity and plasticity). In contrast, the ligaments and joint capsule contributed 47% (see Table 2.1). Consequently, the latter tissues are extremely significant in determining the ultimate ROM of a joint. It therefore makes sense to keep this structure optimally mobile.

Structure	Resistance
Joint capsule	47%
Muscle (fascia)	41%
Tendon	10%
Skin	2%

Reprinted, by permission, from R.J. Johns and V. Wright, 1962, *"Relative importance of various tissues in joint stiffness,"* Journal of Applied Physiology 17(5), *824-828*.

Table 2.1: Comparison of the relative contribution of soft tissue structures to joint resistance

When we say "target the entire joint", we are also describing what to use when a high velocity low amplitude (HVLA) joint manipulation or other joint capsule mobilization technique fails or works only temporarily. FST targets the entire joint with specific parameters of progressive TOC (traction-oscillation-circumduction). When indicated, we will scour the joint surfaces with compression alternating with traction that "backs into" and stretches specific, troublesome "corners" and segments of the capsule that have been ascertained to be restricting freedom of

movement. When proper hip joint mobility is restored in the manner just described, a cascade of surrounding tissue release has been observed to have the following effects:

- An increased SLR from 5–20 degrees.
- Elimination of pain in back, hip, knee.
- Elimination of femoral-acetabular impingement.
- Correction of gait anomalies like femoral external rotation, apparent Trendelenburg sign and more.
- 25–50% decreased soft tissue resistance to stretching of the homolateral limb and 10–25% decrease in the contralateral.

In addition to the above, we target the entire joint to achieve neurofascial effects. As we know that fascia is now considered our "organ of proprioception" (Schleip 2012; Van der Wal 2012), we can manipulate the joint capsule, ligaments and all architecturally connected tissue by stimulating mechanoreceptors. According to Van der Wal and others, the main stimulus for such receptors is deformation (stretch, squeeze, compression) (Van der Wal, 2012). By definition, this improves the function of proprioception through systemic connections between joints, ligaments, muscles and fascia. Proprioceptive feedback loops to the brain, vestibular-labyrinth and skin complete the kinesthetic communication system. Consequently, locomotion and all movement dependent on an optimally functioning nervous system are positively affected because total body kinesthesia has been improved. This agrees with the clinical results seen as a result of using FST (Frederick, 2006).

8. Get maximal lengthening with traction

Ann first discovered the benefits of manual traction when she began stretching football players and wrestlers. When she leaned away while stretching a client, not only were the subjective comments more positive about how it felt, but subsequent stretching to elongate tissue proved much easier. Objective tests post stretch confirmed that traction greatly improved the results of assisted stretching. It appeared that tissues under compression were causing pain, weakness and other dysfunctions. Traction was the main key to providing relief, restoring mobility and strength, as well as improving overall proprioception.

Much later Ann learnt that "original" PNF used joint traction with intent to stimulate joint proprioception and thereby help improve function that required mobility. Whereas an opposing technique called "approximation" (joint compression) was used to stimulate functional movements requiring weight-bearing stability.

FST differs from original PNF in that we traction the joint only as a starting point, then cumulatively traction neuromyofascial tissue upstream and downstream along the meridian line, taking "detours" and intersecting with other meridians, as indicated by constant re-testing of passive, active and resisted movements.

If we continue from the last principle, namely "target the entire joint", it would be helpful to imagine again that we are performing manual therapy on a client. We have assessed that their left lateral chain of neuromyofasciae is compressed around the core/center of the body and the entire line is shortened from below ("leg looks short") and from above (shoulder dropped/depressed toward hip).

If we choose as a global, initial strategy to lengthen the left lateral line by decompressing from the center out, then we might perform the following stretch sequence for optimal results:

NOTE
Specific parameters have been left out to facilitate focus on the sequence and purpose of traction.

1. Traction hip in loose pack position to target hypomobile joint capsule
2. Add hip IR to "lock" hip joint and to get selective, differentiating traction above hip joint, into innominate, quadratus lumborum, ilio - not lilio lumbar ligaments and lumbar facet joints.
3. From #2, pick up contralateral leg and walk to your left and get right lateral spine to side bend in center of the left lateral line.
4. Continue walking to left, at first keeping legs parallel, progressing to legs together then left leg crossed under right leg, then progressed above and then finally below table to progressively increase stretch as indicated and tolerated.
5. Have client actively abduct arm to the point where the client feels an increased lateral line stretch; client may hold top of table if it improves the stretch.
6. Add right lateral side bend of head/neck, arm following to increase stretch as tolerated and indicated.
7. Flex legs and head/neck bringing arm down to front to avoid coming back through same path of movement as the stretch (avoid contracting lengthened tissue).
8. Re-assess response to treatment.

This is a good example of how maximal lengthening with traction along an entire myofascial meridian can be used to correct structure like leg length discrepancies and other coronal plane imbalances. The massive sequential decompression will

improve nerve and muscle function and modulate pain caused by these factors.

Note however, that the entire sequence just described is not static stretching; the parameters are constantly modulated to what the tissue requires at that particular moment. For example, traction-oscillation-circumduction (TOC) is performed with the intent to act on fluids like blood and lymph with alternating physical or mechanical flushing, as indicated by the individual.

9. Facilitate body reflexes for optimal results

PNF was chosen and used in the original FST research in 1995 because research on stretching at that time indicated that PNF had the best outcomes for increasing ROM. As of this writing, this is still true (Hindle 2012; Sharman, 2006).

FST modified original PNF such that the contract part of the contract-relax technique for the target tissue to lengthen was greatly reduced from original parameters of 50–100% to our parameter suggestion of 2–20% of maximal contraction. We call PNF modified for FST, “FST-PNF”. This was discovered by a trial and error process with daily practice-based evidence. Original PNF was developed to serve the needs of a polio population that suffered denervation problems and therefore needed maximal contraction with assistance of synergists for the technique to work best. Our research indicated that far less active contraction on the part of the client was needed to produce the best outcomes. Naturally our client population had intact and, for the most part, fully functional nervous systems, and therefore didn't need more than 5–20% contraction to (hypothetically) activate the GTOs and get post contraction relaxation of the target tissue. See box for 18 ways FST-PNF is different to traditional PNF stretching (some terms listed will be described later in this chapter).

18 ways that make FST-PNF different to traditional PNF stretching

1. Traction
2. Breath guided (not time based)
3. Gentler contraction 2-20% (not 50-100%)
4. Shorter duration (3–4 seconds not 6–10 seconds)
5. Two types of contraction-concentric and isometric
6. Reps are individualized for each client
7. Traction-oscillation-circumduction in between reps
8. Changes the angle of tissue targeted for each rep
9. Flow of movement
10. Easier on both therapist and client to execute
11. Use of table straps for stabilization
12. Unique sequences
13. Choreography of movements
14. Start with core of body, then move out to extremities
15. Unique client positioning
16. Unique therapist positioning
17. Use of our StretchWave concept
18. Use of different tempos to guide nervous system response

To give you a general idea of how we adjust and modulate FST-PNF to the client, we can compare stretching two very different kinds of clients: one an endurance (slow-twitch) athlete and the other a power (fast twitch) athlete. For this example, we will say we are stretching for the purpose of improving results for post training recovery.

NOTE
More details are discussed in Chapters 5 and 6 in the Technique section.

Endurance (so called slow twitch) athletes:

1. Intensity: more
2. Duration: more
3. Repetition frequency: less

Power (so called fast twitch) athletes:

1. Intensity: less

2. Duration: less
3. Rep frequency: more

While the general population may also fall into slow and fast twitch "types", age, disease, pain and many other factors are taken into consideration when adjusting parameters of resistance to improve flexibility. We therefore use the first one or two repetitions of contract-relax sequences as a test to find out what combination of intensity-duration-frequency yields the best response. The best response in a restoration stretch session is one where tissue release is felt to be optimal by the therapist. More details about adjusting the parameters of intensity, duration and frequency are discussed in the next principle.

(It is interesting to note that our parameters for FST-PNF parallels that which occurred with the advent of at least one of the more commonly used styles of muscle energy technique (MET), that of Fred Mitchell, D.O.)

10. Adjust stretching to current goals

Parameters of intensity, duration and frequency are just the preliminary considerations when designing an appropriate FST session. However let us start with these three parameters to get an idea of how one adjusts manual stretching to fit the client's goals with their needs:

Intensity

It goes without saying that the advanced, highly aware therapist quickly determines the intensity, much less all the other parameters, that are required of the moment. With professional athletes, you usually get only one chance to prove your effectiveness as a therapist, as they are experienced, demanding clients.

Thus when we teach FST we warn our students: "NEVER stretch beyond where your gut tells you". You will get clients who, for whatever reason, will request or even demand you give them a more intense stretch. Experienced and aware therapists know to: "listen to your gut, not your client (at least in this specific instance)!"

Intensity is guided by tissue barrier feel (and of course, by your client) – through the free unrestricted range of motion as a passive joint and soft tissue mobilization. Then one encounters R1, known as the first barrier of tissue resistance that should make you stop the movement before it passes through the barrier (Maitland 1991,1986). Tight nerves, for example, feel different to tight myofascia and have an R1 sooner in the ROM than oftentimes expected. They require a different stretch movement, with far less intensity and duration than most other non-neural tissue.

Duration

Duration is closely tied to intensity. The therapist may experience a satisfying soft tissue release with strong or weak intensity. As long as the tissue continues to release while the stretch is performed, one can maintain the same intensity although there are times when, if you slightly release the intensity, ROM increases anyway, thus prolonging the duration of the stretch.

In contrast fast twitch athletes, like sprinters, often respond better if you keep intensity and duration low while increasing frequency. It's as if they are literally and structurally "highly-strung" and require a slow dance with their nervous system, moving into and out of the path of movement intent before increasing ROM.

Frequency

Repetition of a stretch sequence does not follow a strict protocol of, for example, three reps per stretch. Rather, it is married to intensity and duration and follows what the tissue needs. Again, the experienced therapist knows exactly what this means but it is worth reading this section as performing FST is different, which will become apparent if you practice this on enough clients.

When we worked with Olympic level sprinters and American football players, most veterans of our work initiated their own rhythm of PNF active contractions for the FST sessions. This proved to have better outcomes than when the therapist imposed a protocol, i.e. set number of reps; set time of duration; set resistance of intensity. What we learned from this was, when stretching clients with superbly trained nervous systems – athletes, dancers, martial artists and people well connected with the form and function of their bodies – there is more dynamic intelligence and communication accessible to individualize treatment than a strict list of pre-determined protocols would allow. Protocols are helpful but subservient to client needs of the moment.

Summary

We developed the Ten Principles of FST in response to our observations while performing FST daily on clients for almost 20 years. The principles are a distillation of what we consider essential in the application of FST, in order to get the best possible results, and are a fundamental aid in teaching the technique. Now that you are familiar with the FST concepts, it will be easier to understand the comparisons and contrasts with other stretching methods or techniques as discussed in Chapter 3.

Contraindications for FST

Renowned sports scientist Mel Siff, PhD said: "There is generally no such thing as an unsafe stretch or exercise: only an unsafe way of executing any movement for a specific individual at a specific time" (Siff, 2000).

In addition to strict no-nos for stretching (we assume you know, for example, not to stretch unmended fractures, etc.), here is a list of a variety of factors that may require precaution if not contraindication, depending on the individual (Alter, 2004):

- Lack of elasticity of connective tissues in muscles or joints
- Skin disorders, including scleroderma or scarring from burns
- Sudden muscle tension
- Contractures
- Stimulation of deep tendon reflexes
- Lack of coordination and strength in the case of active movement
- Limitations imposed by other synergistic muscles
- Paralysis
- Spasticity
- Congenitally long or short ligaments and tendons
- Bone and joint structure limitations
- Gender, for example, pelvic structure
- Hormones, for example, relaxin
- Pregnancy
- Body fat/obesity
- Significant postural syndromes, such as scoliosis or kyphosis
- Inflammation and effusion
- Pain – stretch threshold or tolerance
- Fear
- Immobilization in a cast or splint
- The presence of any simultaneous movement in another direction
- Body mass – e.g. large biceps or quadriceps limits flexion
- Temperature – decreased elasticity with cold
- Age, for example, increased collagen deposition
- Ethnic origin differences in pain tolerance
- Training, for example, DOMS or over-training makes one tighter, stiffer
- Circadian variations (time of day)
- Vocation – sitting all day versus standing all day
- Medications

- A full bladder

In general, to increase ROM at a joint, stretching and ancillary procedures must do at least one of four things (when appropriate):

1. Increase the extensibility of connective tissues in muscles or joints.
2. Reduce muscular tension and thus produce relaxation.
3. Increase the coordination of the body segments and the strength of the agonistic muscle group. Or
4. Reduce inflammation, effusion, and pain.

However there may be cases where big, red flags warn you against increasing ROM whether by stretching or other means. A whiplash injury comes to mind, where the muscles in spasm around it are actually stabilizing an unidentified dens fracture. When you can't do anything to release neuromyofascia, there may be a very good reason not to go any further, and consider referring to the appropriate professional. In the previous case of whiplash, an open mouth x-ray should be immediately ordered and a fracture and/or sprain ruled out before having the client return to see you.

The caveat, "when appropriate" is determined by the stretching technique employed. Loss of motion because of abnormal bone and joint structure is also beyond the scope of any stretching procedure.

Indications for FST

Complaints or symptoms of 'tightness' or 'stiffness' are fine but often not very helpful to the manual therapist. That is not to say that we have not had great results with those categories of clients that literally come in on their own volition to get FST. They often say something like, "I know I need to get stretched, so that's why I'm here." Or commonly, we get a coach who tells an athlete or a trainer who tells a client to get FST to improve speed, strength, power, balance or coordination.

Here is a list of some conditions and goals we have successfully treated to alleviate or eliminate symptoms and dysfunction and improve function and quality of life:

Pain conditions

General pain etiologies successfully modulated by FST include (but not limited to): arthrogenic; myogenic; neurogenic; psychogenic; iatrogenic; associated with other diseases (for example, cerebral palsy, multiple sclerosis, Parkinson's, degenerative joints, osteoarthritis, spinal discogenic); chronic non-specific low back pain; total arthroplasty; cosmetic and other post surgical scar complications; so called "growth spurt pains" in young teens; PTSD.

Structural conditions with or without pain

- resolve leg length discrepancies of multiple etiologies
- correct lumbo-pelvic-SIJ- hip: torsions, upslips, rotations
- improve gait: increased stride length; decreased hip external rotation(s)
- improve posture: increase total body height 1–2 inches (2.5–5 cm) in adults
- hyper-lordosis and thoracic hyper-kyphosis; increased lumbar hypo-lordosis; overall improved alignment; improved scaption
- decrease pronation dysfunction

Sports

- increase running speed
- increase vertical jump
- increase strength
- improve balance
- improve coordination
- improve flexibility

Summary

Between and perhaps beyond a strict list of indications and contraindications is a large grey zone where there is not much evidence, neither scientific nor anecdotal, that can give assured guidance as to whether FST (or anything else for that matter) will work in particular client cases.

However if all who work directly on people believe in and work by the principle, "Above all do no harm", then experience and intuition should serve you well, as it has us and numerous others. That is to say, after taking a thorough interview with the client and screening for any red flags; after performing a comprehensive evaluation; after getting the approval (if need be) from a healthcare practitioner overseeing the care of the client; and after considering referral to another practitioner with more or other expertise in areas that the client may need, we encourage you to consider the possibilities if you decide to take on the client.

The following possibilities exist both because we have seen it work for our clients and students, as well as others and their clients:

- Rapport, trust and connection make you the chosen therapist who finally makes an impact in the function and wellbeing of a client. This is because the client has chosen you to be the one they completely open up to physically, mentally, emotionally and spiritually.
- When the client chooses you to be the key therapist in their recovery, you are obligated to complete the journey, only if you feel capable of the commitment.

- When a relationship of this magnitude occurs, healing in the deepest, most meaningful manner is possible.

If you have read Chapter 1, then it should not be a great leap to understand why spontaneous healing occurs. We discussed how stretching cells and tissues can do things like reverse cell death, heal cell injuries, positively affect gene transcription, stimulate growth factors, improve our mind-body sense of wellbeing by improving interoception, aid in cell communication through mechanical force transmission and more. There is also much that we obviously don't know or understand that may aid or complement these processes and research on how much of this can be applied with therapy is lacking. The point here is that FST used ethically and professionally, is often the tipping point for our clients and appears to complement the natural ability of the body to heal itself. We invite you to apply the principles and techniques in this book and experience the possibilities for yourself and your clients.

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3

Comparisons and Contrasts

Introduction

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. We purposefully restrict ourselves to discussing methods and techniques of manual assisted stretching with movement. The chapter is organized as follows:

- Common stretching methods and techniques.
- Other contemporary stretching methods and techniques.
- Ancient stretching techniques.
- Manual therapy techniques that integrate stretching.

The chapter concludes with a comparative discussion of how FST differs from other techniques so that you will have a clear idea when it is indicated during a manual therapy session.

Common stretching methods and approaches

We start with stretching-only methods, of which there are much fewer than methods that either always or sometimes integrate stretching with other forms of manual therapy. Categorizing like-to-like makes comparisons easier to understand.

Since the dictionary indicates that the word "technique" is close to the meaning of "method", we decided that "approach" would indicate more of a singular execution of technique without regard to a set of rules, theorems or protocols.

Since the word "method" or "system" refers to "a settled kind of procedure, usually according to a definite, established, logical, or systematic plan" (Dictionary.com), the following fit into this category:

- Proprioceptive Neuromuscular Facilitation (PNF)
- Fascial Stretch Therapy (FST)
- Active Isolated Stretching (AIS)

Proprioceptive Neuromuscular Facilitation (PNF)

PNF should be familiar to most if not all advanced manual therapists. Please refer to the original book for more details if necessary (Voss et al, 1985). While describing PNF as a stretching method would be highly inaccurate, the stretching that is used within the entire technique has enough established, reliable and valid data and logical application with various successful permutations that it deserves mention here. However it must be kept in mind that stretching in original PNF was only one parameter of many, used mostly for the purpose of neural stimulation to increase strength in disorders of the neuromusculoskeletal system.

The salient points about original, manually applied PNF stretching are:

- The weak agonist needing strengthening is placed in a position of stretch to elicit the stretch reflex.
- Eliciting the stretch reflex also recruits synergists of the agonist to assist in total strengthening of the agonist pattern of movement.
- Adding specific spiral and diagonal positions to the elongated body part(s) yields better outcomes in motor pattern recruitment (increased strength throughout more of the pattern).
- Maximal manual resistance throughout ROM is applied by the therapist to the client.
- Maximal voluntary effort of muscle contraction by client to meet therapist resistance (current PNF instructors now reportedly use the word(s) “optimal” or “appropriate” resistance. (Alter, 2004).
- Combinations used in stretching/strengthening are related to primitive movement patterns, postural and righting reflexes.
- Movement combinations include isometric, concentric, and eccentric active contractions, along with passive movement.
- Inhibitory techniques used to decrease motor neuron excitability to increase joint and muscle flexibility.

Regarding ROM, numerous investigators found that PNF stretch techniques produced the largest gains in flexibility, as compared with other forms of stretching. One journal stated “application of PNF principles of spiral and diagonal patterns of movement also produces superior three-dimensional functional ROM to standard static stretches” (Alter, 2004).

Fascial Stretch Therapy

Since FST concepts have been extensively explained in the previous section, the point of comparison here is that the only similarity to PNF is the utilization but modification of the Hold-relax (H-R) technique. Original PNF describes H-R as active movement into the new ROM after the antagonist contracts isometrically then relaxes. In FST, the client first initiates a few degrees of gentle isotonic contraction of the antagonist before it is simultaneously stopped by the therapist to perform an immediate gentle isometric contraction of the antagonist. After a brief relaxation, the client is moved passively by the therapist into the new ROM of the agonist up to the next barrier of motion and the sequence is repeated. An isotonic contraction of the agonist is sometimes added for the last one or two repetitions to further increase ROM if needed.

Other than that, FST follows its own established method of:

- Ten FST Principles (described in Chapter 2).
- Unique sequence of innovative movements (described in Techniques in Chapters 5 and 6).
- Global neuromyofascial chain to local unit underlying approach.
- Spiral, diagonal and rotational patterns of movement (in Techniques, Chapters 5 and 6).
- Parameters of intensity, duration, repetition and tempo of stretch movements adjusted for the individual (in Techniques, Chapters 5 and 6).
- Modulate the nervous system before you stretch any tissue.

Active Isolated Stretching (AIS)

The only system of stretching mentioned in the unrivaled textbook, *The Science of Flexibility,* was AIS. Other kinds of stretching mentioned or compared in that book appeared, according to the author, not to be part of an actual system that is organized in a particular way to define it as a unique method. Thus, the other stretches fell into a muscle-by-muscle, stretch as required description that might be utilized for medical, therapeutic or sport requirements (2004).

AIS has been likened to a "modified PNF" technique due to its close similarity to other stretching techniques that are ultimately other variations of PNF, if only the two-second protocol is removed (Alter, 2004). Regarding the two-second protocol advocated in AIS, there is much controversy as to the statement authored by founder Aaron Mattes,

"…stretch the muscles…to the degree where the myotatic (stretch) reflex is activated and move beyond to the point of light irritation. Stretch gently for one and a half to two seconds providing less than one pound of assistance, release the

pressure, return to the starting position and repeat the prescribed number of repetitions. Releasing the pressure on the tissues being stretched at the point of light irritation helps prevent the reversal contraction of the tissue triggered by the stretch reflex." (Mattes, 2000)

So far no research has substantiated the precise protocol of using one to two seconds duration for a stretch. Alter states, "The stretch reflex in the calf muscles is elicited in 30 msec (0.030 s) or 3 hundredths of a second. Muscles that are closer to the spinal cord, such as the hamstrings, are even faster. Two seconds is an eternity in the nervous system." Consequently while AIS may produce positive results, it is doubtful that the stretch reflex is elicited equally in all the 600+ muscles of the body in one to two seconds. Furthermore, Alter states "…no published studies have compared the efficacy of AIS to other stretching techniques" (Alter, 2004).

The Five I's of AIS (Mattes 2000):

- Identify the specific muscles to be stretched.
- Isolate the muscles to be stretched by using precise localized movements.
- Intensify the contractile effort of the agonist muscles opposite to the antagonist muscles that are reciprocally relaxing and lengthening on the opposite side of the joint. Reciprocal innervation of the muscles to contract will also simultaneously reciprocally inhibit the opposite side muscle to relax and lengthen.
- Innervation – reciprocal innervation (tissue signaled to contract) contracting action of a muscle or muscle group (agonist), which is neurologically encouraged to contract, while the opposite side (antagonist) muscles are neurologically prepared to relax.
- Inhibition – Reciprocal inhibition reaction of a muscle or muscle group, which is neurologically signaled to relax while the opposite side (agonist) muscles receive nerve signal to contract.

While AIS bases the neurophysiology of its technique on the same principles of Sherrington's Laws as original PNF, it is different in that it purports to specifically localize the problem, by isolating muscles and connective tissue to improve flexibility. Original PNF and FST on the other hand, first work through assessing and treating entire neuromyofascial chains before localizing.

Other contemporary stretching methods and techniques

There are many books on stretching, a large proportion on yoga and the rest appearing to be variations on standard, traditional stretching, most comprehensively presented in the classic book *Stretching* by Bob Anderson, first published in 1980. As stated above, the great majority of the books on stretching do not outline a novel system for use. Therefore we will omit discussing those stretch techniques, most of it being very similar.

We chose instead to briefly mention and describe other stretch techniques that vary significantly from traditional static assisted stretches that hold a stretch for 15–30 seconds and repeat two to three repetitions. We have come across the following techniques in our research:

- Facilitated Stretching: a PNF based approach that narrows the focus to a single PNF technique, namely Contract-relax-antagonist-contract (CRAC). This technique places the emphasis of stretching on the client, who for example, contracts his/her hamstring first then relaxes. The client then actively contracts the antagonist, or quadriceps in this case, to bring the limb further into the ROM in order to stretch the hamstrings (McAtee, 2007).
- Stretching Scientifically: this is an approach to increasing flexibility by way of using two traditional methods – dynamic and static stretching – and two less traditional methods, static active and isometric stretching. This method has been described as a self-stretching method, with no directions for any assisted techniques (Kurz, 2003).
- Resistance Stretching®: while Stretching Scientifically uses isometric resistance during stretching, this method uses resistance throughout a full range of motion. While described for self-stretching as a method to gain both strength and flexibility, it is claimed that assisted resistance by another enhances those effects further (Cooley, 2005). After reading the book and viewing the videos about Resistance Stretching, the authors of this book came to the conclusion that the system is more of a training methodology than manual therapy.

Ancient stretching techniques

- Thai massage and bodywork: a centuries old system that, in general, uses a combination of acupressure with assisted joint mobilization and stretching, traditionally done on a floor mat. It may also be considered as an assisted yoga method.
- Assisted yoga: as Thai bodywork noted above, assisted yoga is also centuries old. It can be applied by an instructor to improve a student's yoga postures or *asanas*. It can also be used therapeutically as an assisted stretching technique where stretches are either held statically or may flow from position to position.

Manual therapy techniques that integrate stretching

- Muscle energy technique (MET): this method purportedly originated from the osteopathic field and has since evolved into many different techniques called by the same name (Chaitow, 2006). The original and current forms of MET bear a similarity to original PNF, described above.
- Positional release technique (PRT): a cluster of gentle and indirect methods that are indicated for pain, inflammation, spasm, and recent trauma conditions. Included in PRT are a variety of stretch techniques that may sometimes accompany PRT when indicated (Chaitow, 2007).

Summary

There are many stretching methods and techniques beyond static stretching that have not been scientifically researched but have much clinical evidence for positive outcomes. Most methods of stretching present techniques to stretch an isolated muscle. In contrast, FST presents an assisted stretching manual therapy system that is applied to entire neuromyofascial chains. When FST is regional and focusing on one particular area or muscle, that area is assessed and manually treated or stretched in the context of the myofascial chain it resides in, as well as on other chains that intersect with it.

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4

Assessment

Introduction

The information in this chapter is supported by the experience gained through evaluating and treating thousands of clients when we operated our FST clinic for almost 20 years. It is also based on feedback from the thousands of professionals we trained that are using FST assessment and treatment methods.

The Subjective-Objective-Assessment-Plan (SOAP) style of note-taking is utilized for client records, a system that is prevalent and familiar in the medical and massage community.

As any therapist should know, the initial assessment is unarguably the most important session one can have with a client. Therapy and training depend on an accurate client history, clear tests and measurements and some indication from the first treatment or training that the session is headed in the right direction. Reassessment within the first session will immediately indicate whether the therapist needs to quickly adjust treatment techniques to ensure a positive outcome. Ongoing re-assessment during each session also enable the client to become aware of progress, which is extremely motivating especially if radical changes occur, as they do with FST and other effective manual therapies.

Depending on the therapist and the client, FST assessment may include all or some of the following:

- Subjective interview: including but not limited to:
  - Pain behavior over 24 hours.
  - Sleep pattern if known – is/are current symptom(s) related to sleep pattern?
  - Medications and side-effects thereof, if known or suspected.
  - Occupation to see if it's a contributing factor.
  - Relevant family history.
  - Special questions related to cancer, Lyme's disease, etc.

It is our experience that a successful interview may provide up to 75% of the information needed to lead the rest of the assessment to an accurate diagnosis.

- Objective tests and/or measurements (note: most tests in manual therapy require

static and/or dynamic palpation).

- Client observation including how client responds to interview, voice quality, energy level, etc.
- Functional static and dynamic movement patterns relevant to the client including but not limited to:
- Gait
- Posture
- ADLs, for example, transfers stand to sit; stand or sit to recumbent; sleeping and driving positions, etc.
- Movement pattern peculiar to the problem at hand, as well as related patterns
- AROM-PROM-RROM
- Osteokinematic and arthrokinematic tests
- Osseo-ligamentous integrity-stability tests
- Neurological tests
  - Motor control of specific movement patterns
  - Cranial nerves
  - Vestibular and other balance tests
  - Coordination
  - Myotomes
  - Dermatomes and/or peripheral nerve sensation
  - Deep tendon reflexes
  - Central nervous system and/or peripheral nerve tension-glide-slide mobility
  - Visual tests
- Special tests: any not specifically mentioned here when indicated for specific diagnoses.
- Manual therapy scans: may use all or some of the above to rule out or rule in dysfunction above and/or below the symptomatic region as a contribution to the clinical problem.
- Provocation tests: may use all or some of above to reproduce symptoms so as to have something tangible and relevant to re-assess and guide treatment.
- Therapy localization tests: a specific quick test to temporarily activate what is weak or inhibited and/or inhibit what is over facilitated.

- Assessment: summary of all the findings to provide a differential diagnosis or diagnoses.
- Plan: short and long-term goal setting.

The topic of manual therapy evaluation and assessments is complex and lengthy, worthy of its own extensive text. Therefore this section will be restricted to what the authors have found most helpful when teaching FST to manual therapists.

Nevertheless all therapists will still be able to easily integrate their current level of assessment skills and hopefully gain even more expertise through what follows.

Palpatory literacy

Osteopath and author Chaitow states, "Skillful palpation allows for discrimination between the various states and stages of dysfunction, with some degree of accuracy" (2007). He quotes Lord and Bogduk (1996) who found one study comparing manual diagnosis to the criterion standard of local anesthetic blocks, "The authors found that the sensitivity and specificity of the manual examination technique to be 100%". Chaitow goes on, "This study of the skills of one therapist's ability to localize dysfunction suggests that isolating a segment or joint that is dysfunctional is well within the potential of manual therapists, if palpation skills are adequately refined" (Chaitow, 2007). Despite other research to the contrary, the above noted conclusion that a therapist can be 100% accurate in palpatory diagnosis confirms the ongoing need for highly developed levels of palpatory skill. In FST, as in some other manual therapies, palpatory skill should cover the spectrum of passive, active and resistive dynamic motion and movements, not just stationary exploration. Precise palpatory treatment should naturally follow an accurate diagnosis in manual therapy.

As this is a book for advanced manual therapists, this section will assume many readers to have an advanced state of palpatory literacy. After working closely with a few thousand students during FST training, it has been observed that there is a broad range of said literacy that does not correlate with their years of experience or with any specific profession. Therefore some discussion about the specific skills that are needed and used in FST are warranted. The following is organized so that FST-specific skills of palpatory literacy are applied first to assessments of static conditions before movement is evaluated.

Movement vs motion quandary

In brief, there is not much standard agreement in manual therapy on how or when to use the words "movement" or "motion". One researcher who studied this conundrum decided to use the word "motion" when the subject requires quantification; and use the word "movement" when discussing something qualitatively (Jensenius, 2011). Deemed acceptable by the authors, that is how those words will be used in this and subsequent sections.

Let's START

It is useful to think of the acronym START with FST modifications whether the client is assessed in upright positions or on the table (adapted from Gibbons & Tehan, 2010):

- **S** – symptom reproduction: Although some somatic conditions may be pain-free, pain or other reproducible sensations of dysfunction is an essential (although if not elicited, understandably not always) part of the assessment.
- **T** – tissue tenderness: Must be differentiated from pain. Besides being an obvious local sign, it may be a general sign of low to high systemic inflammation from a range of other environmental-nutritional-medical factors.
- **A** – asymmetry: The involved side must be compared to the uninvolved side so that one has a control. If both sides are involved or the other side is unavailable then the quantity and quality of training and experience will come to bear and have to guide the therapist.
- **R** – range of motion quantity and movement quality: May be at one or more segments, entire myofascial chains or body regions. Determines if anything is hypomobile, normal, hypermobile or unstable from a tear. Also helps to determine the state of biotensegrity of the area in relation to other pertinent areas, as well as to the rest of the body, i.e. what is under excessive compression, tension or shear.
- **T** - tissue texture changes: While important to directly detect palpable changes differentiated within multiple layers, FST assesses this intrinsic state by way of its response to particular extrinsic movements. Using a table-based example, imagine making a transitional passive movement with a client's lower extremity from the sagittal plane, straight leg supine position to the externally rotated, horizontally abducted position in the coronal plane. Imagine palpably differentiating, not only with one's hands but also with one's entire body. One should feel not only the quantity but also the specific quality of tissue movement between, say, the fascial interfaces of the middle and medial hamstring compartments along multiple angles of myofascial tension and changing axes of hip rotation.

START informs every static or dynamic, stationary or moving assessment or treatment in FST. One may question then, how is range of motion or movement assessed in, for example, a static posture evaluation? One answer is that even when a therapist manually cues a client to make a slight postural shift to improve alignment and see whether symptoms change, there is a small active-assisted movement to make that shift that is assessed along with everything else. Yet the more comprehensive point is that whether one is testing the manual response to how

skin rolls or how a client makes the full body movement transition from the low to high position in a tennis serve, the quantity and quality of relevant movement is assessed concomitantly with symptom behavior changes.

Most often, FST treatment will follow the assessment findings spontaneously and immediately for optimal results and best outcomes in meeting client goals.

Assessment techniques in a nutshell

Despite the complexities of assessments, offering a nutshell approach may help, especially those less familiar with manual therapy. The nutshell offered is this question: "What can be manually Lengthened-Shortened-or-Stabilized (LSS) to improve symptoms and signs?" Here is a brief explanation of what a manual therapist will attempt to do during an assessment to improve signs and/or symptoms:

1. Lengthen: inhibit/stretch/release/open what is hypertonic/over activated/tight/compressed.
2. Shorten: activate/stimulate/facilitate/compress/close what is excessively lengthened/ inhibited/weak.
3. Stabilize: support what is hypermobile, unstable and/or painful concomitant with lack of or poor motor control.

When it comes to deciding what is appropriate for stretching, what needs to be stabilized and what needs to be shortened and/or strengthened during an FST session, having LSS in mind will keep the intent clear for the therapist and the session safer and more effective for the client. Keeping an adaptable LSS protocol in mind helps one to proceed logically and simultaneously keeps one creatively engaged to assess and treat the individual, not a pre-defined or categorical condition. This will become clearer in the text that follows.

SITTT

Expanding on the assessment techniques above leads to the discussion of using SITTT or Scan-Identify-Treat-Test-Treat again. When SITTT is done properly it often takes only seconds to a few minutes to offer reliable and valid best treatment options. General descriptions of SITTT technique are given below – purposely in brief – as they are covered in more detail with practical applications, in the Assessment Flow section of this chapter. Specific descriptions of SITTT as applied to specific body regions and tissues under different clinical conditions will be discussed in a following section titled "Regional flow of the assessment". The following is a description of the SITTT acronym:

S – Scan the suspected region with a dominant hand in order to find the optimal location where testing a working hypothesis of treatment should start.

Technique:

The therapist's hand is applied in a light, gentle manner to exposed skin (where possible but not mandatory) in a quadrant of choice on the client's body. While it may seem logical to start at the involved quadrant that has a known problem, the actual location for optimal easing of symptoms may exist in any lower or upper body quadrant, oftentimes regardless of the diagnosis or symptoms. Manual scanning quickly resolves this dilemma for reasons not completely understood or researched. Practical examples follow in the Posture-Myofascia-Joint-Nerve section on p52.

I – Identification of which fascial line(s) and/or what local tissue(s) have an easing effect on the client's problem(s) is a result of thorough scanning. Once the proper region is identified, serial mini-treatments and testing to find the best treatment response can begin.

T – Treat the local tissue or global chain within which the local tissue resides. This is a mini-treatment in the sense that the therapist will test whether they can ease or even eliminate the client problem with a variety of manual diagnostic methods. Because it is a mini-treatment, the client may remain in any functional position for the therapist to "quick treat". This has the added advantage of immediately testing the client's function without having to get up and down repeatedly from the table (discussed in the next "T" in SITTT).

As previously stated, in general, the goal is to lengthen, shorten or stabilize local tissue regions or even entire fascial continuities. An additional technique of fascial shifting will be added and described next.

T – Test whether the quick treatment yields any positive results, such as easing of symptoms, increasing strength-ROM-flexibility, etc. Standard tests such as posture, ROM, neurological, etc. as well as testing functional dynamic positions that tend to provoke the client's problem are done to see whether the quick treatment had even a slight effect on easing the problem.

1. Lengthen example 1: client's head deviates to right in active flexion and is associated with a right-sided, mid-neck pain described as a pinch or compression. Therapist uses one or two fingers to first scan and identify the correct location. This is done by palpating skin and superficial fascia *with intent to lengthen* as the client repeats the same flexion movement. After testing local regions above and below the pain region, therapist finds best response and makes a decision to stop the assessment and treat with FST to lengthen as indicated then re-assess.

Example 2: Therapist decides to continue the assessment to possibly find associative links in the fascial chain that can further ease the symptom and improve function. Manually easing tension of the right Spiral Line close to the right ASIS resulted in no pain and best response upon re-testing neck flexion. Therapist stops assessment to treat the finding that is distal from the symptom.

2. Shorten example: a teenager with a history of poor posture complains of low back pain whenever she leans backwards. Therapist thoroughly assesses many factors that may contribute to this condition, such as whether antagonists like the iliopsoas are fascially locked short, thus inhibiting the spinal extensor agonists. However only manually assisting the soft tissue over bilateral facet joints of L5/S1 to shorten during active lumbar spine extension eases the pain.
3. Stabilize example: client complains of hip pain concomitant with homolateral adductor strain and contralateral thoracic strain whenever shifting to that hip or balancing on that leg. History and other tests suggest gluteus weakness and/or hip joint instability. Therapist manually compresses ilium, as client shifts weight to the involved side then also attempts to balance on that leg. All pain regions are gone, balance improved. Client experiences success on hip stabilization program.

NOTE
While assessing local or regional tissues often involves applying either a manual lengthening or a shortening shift to change the effects of fascial strain on signs and symptoms, a combination may also be used. For example, with the commonly seen forward head-increased thoracic kyphosis – forward shoulder syndrome – one may apply a lengthening technique to tissues anteriorly while simultaneously using a shortening technique posteriorly. This method often works better in this particular area of the body.

T – Treat again. If only a slight improvement is noted, one must question whether the treatment was adequate, for example, was the appropriate tissue layer accessed and affected? Or one may consider starting at the beginning with a new scan to find a better location to quickly render a mini-treatment and re-test.

There are two scenarios:

1. The test yielded positive outcomes and therefore warranted a proper setup for a complete treatment. For example, if the quick treatment was conducted in standing, then the therapist may want the client to recline so as to have the proper leverage and so on for a “real” treatment.

2. The test yielded no outcome or perhaps made the client's symptoms worse. Then either another, different kind of quick treatment may be tried and re-tested or the therapist may need to start from the beginning and re-scan to find a more appropriate location.

In any event, SITTT is repeated until optimal responses to quick treatments and re-assessments determine where the primary problems are and what manual techniques best serve the condition. We will briefly review the assessment techniques used in FST that have been described: after a thorough subjective client interview, manual scanning is done to quickly identify where dysfunction in strain distribution exists in the body biotensegrity. A quick "treatment" is rendered, maintaining local or full body global change in a lengthened, shortened or stabilized position. Testing is commenced by subjective and objective analysis to see if the client feels different and if anything has changed favorably, from static postural shifts to dynamic movement improvements.

If the outcome has not changed or the client feels and/or tests worse, then it is suggested that the therapist default to the lengthen-shorten-stabilize paradigm again, occasionally even doing the opposite treatment to that which previously had a poor or no result. Exhausting those options without satisfactory effect should lead the therapist to re-consider if the subjective analysis was adequate, namely, as accurate and complete as possible. If so, then one must re-start the SITTT process until one locates the proper region(s).

Experience shows that assessments following these suggestions help the therapist to arrive at a working solution faster and more accurately than not. The next section covers how to make these assessment techniques flow in a comprehensive and logical manner.

Assessment flow: global to local, static to dynamic

The following has been found to be an effective and logical means to think about and perform a manual therapy style of assessment. The goal is to discover which method of adjusting local and/or global tensegrity (along with concomitant physiology) can ease the client's problem. Once the problem is eased then the proper treatment can commence. The flow goes from using the previously described SITTT to initially achieve global, full body subjective and objective improvements and then progresses as indicated, to localize any remaining specific tissue problems.

Movement must be individually assessed, first in functional, weightbearing and other relevant positions. This will not be exhaustively covered in this book, due to its focus on table based FST. However, some essential movements in upright positions will be discussed in enough detail, for the principles to be understood

and applied in most common circumstances. Table based assessment follows and will be the focus to facilitate a flow directly to treatment as it is most often used in FST.

The assessment flows in the following manner: Posture–Myofascia–Joint–Nerve:

1. Posture testing

Posture (aka body reading) examined from a fascial line perspective is an effective way to visually, manually and intellectually analyze both global and local conditions of the body. Posture should be assessed both statically and dynamically as well as under both unloaded and loaded conditions that best reflect the client's function. For example, if the client only gets shoulder pain when carrying a stack of bricks at work, then the therapist must simulate as closely as possible, the exact body positions and conditions that elicit the symptoms, for optimal and accurate re-assessments. Yet, it is also important not to overlook the classical, static standing posture assessment. It is, after all, the reference point and foundation of initiation for most movements. But instead of making the usual list of isolated regional faults, note how the body is, literally, holding up against gravity. Note more specifically if there are dominant lines of fascia revealing regions under excessive tension, compression and/or rotation. Then use SITTT and test them with meaningful movement.

Manually investigate if dysfunction resides in one or more regions, or entire connecting lines then test the response to gentle corrective adjustments of the body biotensegrity. The goal is to ease the distribution of strain, reduce or eliminate pain if present and improve functional movement as rapidly and accurately as possible. Use one's hands to manually shift weightbearing, slide regional fascial planes, adjust osteokinematics and decompress the spine or a nerve (and more) in static and dynamic postural positions. Specific examples follow, where the terms used to describe significant postural findings will be Tilts, Bends, Rotations and Shifts. These are defined in the accompanying box.

Tilts: Deviations from vertical, named from the direction in which the top of the structure moves to.

Bends: Refers to a series of tilts of the spinal vertebrae and can be anterior, posterior, right or left.

Rotations: Transverse plane deviations.

Shifts: A translation between one body part and another, a misalignment of their centers of gravity (Myers, 2014).

A. Static

1. Global: using the SITTT paradigm of assessment (described above), an effort is first made by the therapist to get full body tensegrity changes. Despite highly individual manifestations, there are general patterns that are well recognized and familiar to manual therapists. For example, Janda's Upper and Lower Cross Syndrome correlates well with Myers' locked short-locked long body pattern involving the SFL (Superficial Front Line) and its response in the antagonist SBL (Superficial Back Line).

Using the model in Figure 4.1, we see the head shifted anterior, the neck tilted anterior, the thorax shifted and tilted posterior, the pelvis shifted and tilted anterior, the knees shifted posterior, placing the ankles-feet into plantarflexion relative to the tibiae.

Figure 4.1 Posture deviations

The strategy is to find out what manual cue(s), if applied in a certain location affecting a particular line of fascial support, result(s) in the most optimal postural change both in quality, quantity and subjective improvement. However, as opposed to merely attempting to correct posture, which in and of itself has little research to support its value and relevance, it may be more useful to attempt decreasing symptoms or even an awareness of excessive tension.

If, for example, there is a low level ache in the low back while standing, there is an opportunity to see if a strategic manual cue can reduce or eliminate this discomfort while at the same time improve posture. Because there are many choices where the therapist may effect manual change, using one or two hands to scan and identify likely regions where the strain distribution may be localized or distributed can expose whole fascial line engagement.

In the example that follows, experience with the aforementioned dysfunctional postural pattern offers the following suggested options:

- Sub-occipital lift: simply adding two fingers to the sub-cranial region by the therapist as a manual cue for the client to add active lengthening tension to his biotensegrity structure often has immediate global, cascading effects. Among them may be a reduction in magnitude of aberrant patterns in all, most or one fascial plane/s. The reduction in tone or tension in regions under compression are often visually as well as a palpably apparent. Concomitantly one may observe an increase of normalizing stiffness in regions that were slack and appearing weak or ineffective ("locked long") in maintaining stability (for example, abdominals in the SFL). Often a reduction, if not a complete elimination of pain, ache or stiffness may be reported if the lift is maintained for at least a minute so the client's tissues and fluids have time to adapt to the new positions. Please note that this category of client often has extrinsic eye muscle imbalances that contribute, often times in a major way, to the postural imbalances noted. Redirecting the focus and gaze of the eyes to align with the horizon or more may be needed to complete the re-education, if results are to be long term. However this subject of assessment and treatment is beyond the scope of this book.
  - Clients that respond with major improvements in posture and symptoms with this test, will often benefit from an overall global strategy of decompression with FST. In many simple cases like this, the therapist may stop the assessment and commence table-based FST assessment (described below) and treatment. Experience shows excellent outcomes with this category of client. However, if there are more signs of functional problems in multiple regions and/or more pain, further assessment is needed before treatment starts.
  - Other clients may feel that it is too much effort for them to maintain the postural correction themselves, which may mean other yet unidentified regions are still under compression, thus offering a measure of resistance to the globally intended sub-occipital lift. For instance, the thoracolumbar region may be where it is resisting, which is discussed next. Or, the client may be deconditioned and thus needs endurance training for the fascial lines that hold the body up against the forces of gravity and whatever is required for daily functional activities of living.
- Thoracolumbar shift-lift: when using hands scan and then identify this region, one

often feels an immediate lack of resilience and response to manual cuing. It feels immobile and locked down, yet with the proper manual lift and shift opposite to the pattern (i.e. superior-anterior) with cued breathing, this mini-treatment often produces an immediate reduction in stiffness locally as well as in pain distally in the lower lumbar spine and/ or sacroiliac joint(s). Note also how the bi polar ends at the head-neck and knees respond in this pattern. If there is a better global response to this cue than there was at the sub-occipitals, then this is the more likely region for treatment focus, even though the other areas may still be addressed.

- Knee shift: after testing global responses to manual corrections at the sub-occiput and thoracolumbar regions, those results are compared to manually shifting the knees anteriorly just enough to "soften" them out of a locked knee or hyperextension position that is often actively held. Locking or holding the knees is usually a secondary consequence of what is "not right" above and below those joints, so most clients often require motor re-patterning to work with the rest of the body. The trickle down effect of shifting the knees a little forward will usually correct the excessive plantarflexion in the foot-ankle region unless a significant local restriction is present.
- All of the above: naturally, the client may manifest any combination of the previously described posture faults or even have all of them present. The point is to find what may be the dominant player, do a mini-treatment test to confirm and proceed from there.

NOTE

1. Ensure that the client looks straight ahead during all postural assessments and re-education. While this will reduce the tendency for the eyes to have a negative effect on posture, it should be noted that clients should be tested for oculomotor imbalances and/or vestibular disorders if they respond poorly to this assessment.
2. Posture in sitting should be assessed for all clients that function in that position. This may involve experimenting with a variety of seat heights and other extrinsic ergonomic factors that play a large factor in how the body shapes itself to the work and work environment. This extensive topic is not discussed here.

2. Local: When the client does not display a global subjective/objective positive response to static posture testing, a local issue affecting fascial line tension is suspected. Pain or another symptom that does not change is another sign to assess

locally. A unilateral line may be insufficiently supportive and be collapsed and be especially dependent on a local more or less rigid (versus flexible) fixation. For example, this is often seen when only one foot has a pronation dysfunction. One may try to get a global response by using the techniques previously described but usually to no avail, as the pronated foot does not respond.

If verbal or manual cues are used to see if the client can actively supinate the foot but the foot pronates again when it is relaxed, the client has a "flexible fixation". It is flexible in the sense that it can adapt and achieve a new position actively but it is still a fixation, as it returns to an imbalanced, dysfunctional position of function relative to the rest of the body. On the other hand, if the client cannot respond to any cues and the foot remains pronated then they have a "rigid fixation". That does not necessarily mean they need orthotics, only that there is a need for specific manual therapy and motor pattern re-training to get the foot, ankle and rest of the body to respond to triplanar motion and be capable of successfully adapting to varied movement and terrain challenges.

Continuing this example, it is easy to imagine unilateral pronation or, as Structural Integrationists put it, a medial tilt of the rear and mid-foot with a shift of the lower Deep Front Line (DFL) inferiorly. Imagine using SITTT assessment, verbal cues and a little effort from the therapist to manually lengthen the lateral band of the outside arch, but also adding cues to activate and shorten the medial band at the same time which often helps fascial line engagement even more. As a bonus, the entire DFL responds with facilitation and engagement, lifting the arches of the foot to align and balance the bodyweight in a more neutral position. Often accompanying, related corrections all the way upstream along all lines simultaneously occurs. This imagined scenario taken from actual common clinical experience informs the therapist to focus on those areas of the foot during the FST treatment and re-education part of the session. While clients rarely have just one problem, the treatment will be biased toward the unilateral foot and ankle in manual work and then motorically integrated with the rest of the body during the re-training.

B. Dynamic

Once the fascial lines have been assessed statically, it is time to observe them in movement. As in the static exam above, global before local movements will be assessed. However, the local assessment will seek to differentiate myofascia from joint from nerve issues within fascial lines so that the global context of a problem is always considered.

As researchers and clinicians Shumway-Cook and Woollacott state in their text on motor control: "there is no one theory of motor control that everyone accepts" (2012). Consequently, here movement analysis will be restricted to assessing the

quality and quantity of fascial line engagement, as well as lack thereof. Until motor control theories concur and have standard guidelines of practice for all clinicians, the empirical system we will discuss has served practitioners and their clients very well for quite a long time.

At first movement may be tested within the standing base of support position and then the challenge increased by moving outside the base of support. That way, added challenges to balance might be minimized and restricted to other specific balance tests. Tensegrity strain is also minimized such that symptoms of pain and/or instability are less likely to be triggered and movement can be better controlled by both client and therapist to assess pain. Here are two examples of dynamic assessments:

1. Standing full body movements

A. Inside the base of support

- Test full body rotation active movement. This is an excellent functional test primarily of the Spiral Lines beginning in neutral standing, which is the starting position for gait and many other activities of daily living. It also allows one to observe the difference in quality, quantity and sequencing order of myofascial chain activation, skeletal movements and to see whether any of those has an impact on symptoms like nerve compression. Easy access and ability to manually test global and local regions facilitate an efficient assessment for the manual therapist. Other reasons for using this test include:
  - All joints start in neutral posture position thereby minimizing symptoms from uneven joint loading.
  - Neuromyofasciae start with minimal postural tone and tension activation to minimize symptoms from these regions.
  - End position of active rotation only adds a relatively small amount of tension, compression and shear across multiple axial body structures for a quick, full body test.
  - SITTT can easily be used to assess/assist/resist local motion or global movement.
  - Provides a good base test from which one may build a matrix of progressive challenge and provocation tests to assist diagnosis.
- When observing movement sequencing, note the relative acceleration/deceleration of the whole body first, then specific regions. Hypomobile joints and/or restricted myofasciae will decelerate much more rapidly in comparison to adequate motion. Hypermobile joints with their excessively lengthened ligaments and attaching myofasciae will naturally go through a greater ROM before decelerating. Strategic assisted manual control – facilitation or inhibition – may be used with SITTT to diagnose problems with

motor control and/or whole or regional myofascial lines, joint(s) and nerve(s). Correlative work with these issues using FST on the table will be described later to logically tie assessment and treatment together.

- Whenever possible, initiate the same overall movement from different ends and parts of the body. We all require this movement ability in our lives whether it's used daily or rarely. The following describes the process of initiating movement first from the head and eyes, with respect to what motions should simultaneously occur on the opposite side of that same region:
  - Head and eye motion
  - Sequential spinal regional and segmental motion, from neck to lumbar
  - Innominate anterior and posterior rotation
  - Sacral torsion
  - Femoral external and internal rotation
  - Tibia-fibula external rotation and internal rotation
  - Feet supination and pronation

The same test should be assessed in reverse sequencing, i.e. starting with feet supination and pronation motion. As many relevant movements as possible that can be tested in this manner will make the assessment more comprehensive and inclusive to reveal the most elusive signs and symptoms one is attempting to reproduce. Naturally, other fascial lines may be similarly tested as indicated.

If assessing in a classical ROM-like manner, such as many therapists do, whole lines of stability and mobility contributing to the efficiency of any motion will always be considered, even if one joint is being tested. In dominant planes of motion, the agonistic line will be observed along with the response of its antagonists and synergists. Finally with any movement assessment, consideration must be given as to whether the client shows observable stress, indicating that they are trying to deal with a perceived threat. Studies show that the brain is wired for survival and any threat creates a cascade of undesired responses that would be best to avoid during therapy and re-education for most clients.

B. Outside the base of support

If the client does not have a condition (for example, oculomotor, vestibular, etc) that manifests as a balance disorder, then one may safely test movements outside the base of support. This includes all movements that move the body beyond where the feet are placed. Many positions of function are outside a simple standing or sitting base and may include transitional movements. A common example of a transitional movement that many clients with back and knee pain have trouble with is going to or from standing to sitting in a car. Movements like this and many others need to be

assessed exactly as the client performs it, with the therapist using the same methods described above using the SITTT method so that it becomes clear what to focus on during the table treatment and follow up movement re-education.

An easier movement to assess is the squat performed in the sagittal plane. Trainers tend to test squats meant for weightlifting (i.e. keep lumbar spine and pelvis neutral) while others test squats as indigenous people perform them (allowing the lumbar spine to flex and the pelvis to posteriorly rotate). More comprehensive assessments will evaluate both functions.

Squat assessment example:

As a test, it is often helpful to place a circular weight plate, shim or similar object beneath the client's heels to raise them. This simulates added length and confirms whether a shortened or tight Achilles and/or soleus muscle is present, causing an aberrant squat pattern. Trainers and therapists familiar with this test will confirm that gross aberrant faults, for example, an excessively forward trunk lean, are often immediately corrected. The common solution then is to stretch the soleus/achilles.

However it is not specific enough to be the only assessment, as it does not indicate whether the problem is due to:

- gross postural shift anteriorly with excessive weight on forefoot/toes
- posterior ankle joint capsule hypomobility
- subtalar joint hypomobility
- talus posterior glide insufficiency
- plantar fascia shortening
- soleus shortening
- heel pad slide hypomobility
- specific scar tissue restriction in any of the above regions or elsewhere
- over activation of: toe flexors, plantar intrinsics, soleus, gastrocsoleus, hamstrings, the whole back line of fascia, etc.

It is much more useful for the therapist to use their hands in particular ways on specific tissues along specific lines of fascia to both test their hypothesis of where and when they think the problem in movement is and how it manifests. This must be done whenever possible in the functional or other position that slightly reproduces symptoms or problems without creating additional, lasting pain or inflammation. When the assessment is conducted in this manner, it is often a rapid process that leads the therapist to adjust the particular biotensegrity (described in Chapter 1) of the individual to test whether it results in any improvement in symptoms and/or movement. It also helps the client assess what they may be doing or not doing that is contributing to the problem.

In the squat example, if the therapist manually differentiates in a test that, for example, assists the posteromedial plantar fascia to lengthen and improves the squat more than everting the calcaneus or postero-medially gliding the talus, then the therapist empirically knows what to do and where to start. For example, the therapist may make a clinical decision to get the client on the table to perform specific manual therapy techniques for lengthening the plantar fascia then return the client to perform the same exact test movement to determine if symptoms and signs improve or not. Barring having precise parameters of evidenced based research available that is pertinent to this case, we have found the previous to be the fastest, most accurate clinical approach for best outcomes in most cases that are commonly classified as orthopedic and musculoskeletal diagnoses, as well as a fair share of neurological cases.

2. Standing (or sitting) extremity movements

Following the logic and sequence of assessment initially described in this chapter, that is Scan-Identify-Test-Treat-Test on Posture-Myofascia-Joint-Nerve (or, SITTT on PMJN), it will be assumed for the purpose of an example in this section, that posture has already been assessed. Maybe it was the case that the shoulder improved 50% when posture was corrected but the client still has shoulder pain. Then again, maybe posture had nothing to do with it. In either case, one must narrow the focus and assess the shoulder. The order of checking: myofascial lines or connections before joints or nerves.

The fact that the normal, daily forces of tensegrity and function have rendered many joint manipulation treatments as temporary and ultimately ineffective, lends support to starting assessment and treatment with myofascia. That does not mean of course that there aren't times when a direct joint manipulation or some other isolated treatment is definitely indicated as the treatment of choice.

Getting back to the shoulder pain example, manual scanning by experienced therapists will take them to regions that correlate with familiar patterns they have seen in history taking and assessments of posture and function. Evaluating regions like the pectoralis minor and coracobrachialis (which sit in the chain called the Deep Front Arm Line), are standard for clients with locked short Superficial Front Lines who sit at desks all day. However if a client, for example, fell on an outstretched hand and has had years of post traumatic chronic pain in the proximal shoulder along with specific weakness and instability, the assessment takes on an even more characteristic direction. This is certainly true when first scanning myofascia for regions of dysfunction that respond to LSS (Lengthening Shortening Stabilization).

2. Myofascial testing

With a client history of falling on an outstretched hand, one tries to imagine how an equal and opposite force from the ground was attenuated by the client. The fact that there is no fracture in our example shows that it was at least absorbed without a strong enough force to break bone. Here, with their rationale, are some suggested places to scan-treat-test:

- Scalene – 1st rib attachment: shoulder was likely forcibly compressed into adduction-elevation with a large portion of the bodyweight on it. Post-trauma daily positioning to lessen pain may have also contributed to this position. After starting with the central axis of the spine and clearing the neck as a source for problems, the next strategy may be attempting to test lengthening the scalene attachment to the 1st rib. Simultaneously re-testing function and/or pure ROM will quickly determine if this is the best way to begin treatment or not.
- Levator scapula: often implicated with other synergists in pathologically elevating shoulder dysfunctions, attempting to lengthen will determine if that helps or not.
- Coracoclavicular ligaments: may have been partially or fully disrupted. Shortening the ligaments and assessing the acromioclavicular and other ligaments in the chain will help determine if this is or is not the case.

After thoroughly scanning through as many fascial lines as makes sense, one then tests joint connections within or intersecting the lines.

3. Joint testing

Continuing with the same client example as above, one may imagine severe joint compression from wrist to shoulder that was sustained during the client's fall. Testing decompression or joint capsule traction-lengthening as well as stabilization in a specific plane of movement may be indicated. This was the case with a student in one of our workshops. When the sternoclavicular joint was stabilized with posterior-inferior compression during active abduction, instability and pain was eliminated as strength and ROM increased.

While lax ligaments and unstable joints may need prolotherapy or surgery as a long-term solution, compressed joints respond quite favorably to decompression or traction during an FST session. Often, increased duration and frequency of repetition are indicated in these kinds of cases and are discussed below in the table assessment section.

In any event, testing joint capsules with lengthening, shortening or stabilization quickly informs the therapist about which direction the treatment should take.

4. Nerve testing

This topic is beyond the scope of this book but necessary to mention, the reader is referred to other authorities on this subject (Shacklock, 2005).

Nevertheless, it will be mentioned that as part of the diagnostic process for the most comprehensive assessment and treatment approach, central and peripheral nervous system testing for mobility – slide, glide, tension, compression – must be included. Due to the high degree of manual sensitivity and other skills required, coupled with the high potential to adversely reproduce symptoms, these tests are performed at the end of the assessment. Elusive, non-responsive neurological and mechanical problems are often discovered and helped using neuromyofascial techniques focusing on the multilayered tissues of the nervous system. From the authors' experience, these tests fit in perfectly with the SITTT protocol and are fully compatible with the rest of the assessment.

Movement assessment summary

In general the more movements become functional and less purely a ROM test, the more neuromyofascial lines are engaged. An example of contrasting tests for shoulder motion versus movement would be having a track and field athlete client do the standard shoulder flexion AROM test and then observe them, ideally with their coach, do javelin throw drills in a field. The first motion generally engages a local shortening contraction of the Superficial and Deep Front Arm line and a lengthening contraction of the Superficial and Deep Back Arm line. In contrast, throwing a javelin also engages full body Spiral, Functional, Lateral and as well as some other lines. In addition to many other things that are activated in a way that ROM testing does not, the visual, vestibular and other parts of the nervous system are recruited in unique, task-specific ways that also need to be evaluated to rule out and/or rule in additional aspects affecting function (not discussed in this book).

As noted with the javelin athlete, movement assessment often offers a dizzying number of possibilities of what to observe and where to start. Therefore to deconstruct and then assess individual, whole fascial lines starting with static posture and progressing to dynamic movements will help simplify the process and organize the flow of the assessment. With experience, one will quickly and accurately begin to understand the integration and intersection of fascial chain dynamics.

Table-based assessment

When imagining FST, the movement of both the client on the table and the therapist should be considered. If manual therapy were an artistic endeavor, the FST therapist as artist would be a dancer, moving gracefully and fluidly back and forth, around the table as well as undulating his or her body up and down and side to side. In the ideal scenario, the client is the willing dance partner.

The point here is that palpatory literacy in FST is dynamic and must extend, with specific intention and in particular sensorimotor patterns, to and from the communicating neuromyofascial nets of the therapist and the client. Surprisingly, the authors have observed that manual therapy professionals find this skill quite a challenge to learn, while trainers and other movement professionals pick up those skills more readily. Despite their comparable lack of static palpatory literacy, movement professionals have the advantage over the therapists in this particular instance while learning FST movement patterns. Some therapists find it somewhat of a challenge and unfamiliar to feel while simultaneously moving their body dynamically during FST. Yet becoming skilled at this way of working is required in order to master the FST system. The therapist's body is, after all, a functional extension of their hands and actually amplifies manual therapy communication, ability and dexterity. Further, if the therapist is uncoordinated or lacking in their ability to move in the way that is required in FST, they must go through more practice drills to ensure they master the choreography of FST before treating clients. Those who feel awkward on the dance floor have nothing to fear! FST will soon become an enjoyable part of your manual therapy. This is discussed in more depth in Chapter 5.

NOTE
Table-based movements and specific motions (discussed next), are a progression and may include all or some of passive, active, active-assisted and resistive patterns.

Passive movement

Traction-oscillation-circumduction (TOC) is the foundational pattern of passive joint and neuromyofascial movement that the therapist will use to get an initial impression of the client's:

- willingness to release voluntary control
- trust in the therapist
- neuromyofascial mobility

- neuromyofascial response to movement intended to change:
  - autonomic state of the body, for example, stimulate parasympathetic versus sympathetic nervous system
  - regional tone and tension
  - fascial strain distribution
  - pain
- joint condition and tolerance to movement

After assessing the client's initial responses to the above, the therapist will have a therapeutic movement vocabulary for the rest of the session to modulate pain, change tone and tension and maintain trust and a rapport with the client for more successful outcomes. However it must be emphasized here, that the information gained in this initial assessment is used to create an *individualized* strategy to the session, which is traditionally often lacking.

TOC assessment

Traction

Traction may be used to assess the following (as compared to the contralateral side and referenced against the therapist's experience with this specific technique):

- whether the joint is hyper- or hypo-mobile.
- whether the neuromyofascia is excessively lengthened, shortened or immobile.
- whether the tissue is or was injured, particularly strains, sprains or other traction events along a particular trajectory.
- whether the client's tissue(s) is locally or globally compressed, indicating traction in all of its variations as a key element for treatment.

Oscillation

Used as another means to assess neurological response to movement. This response informs the therapist about condition of the tissue:

- whether it is healthy and will tolerate more movement, oscillation or otherwise.
- whether the tissue can "calm" down quickly (in seconds) when oscillation is used for local pain, global autonomic or regional tone modulation .
- whether the tissue is "fragile" or "irritable" and pain takes minutes or longer to resolve if at all.

Circumduction

Whenever possible, triplanar movements or circumduction is used, starting with smaller circular movements and, where possible, progressing to larger ones. Assessing both clockwise and counter-clockwise movements will reveal preferential directionality to help refine the evaluation.

The following information is gained from testing circumduction:

- feeling the general mobility of the joint surfaces, capsule and ligaments and determining whether it is satisfactory, needs more stability (hypermobile) or more mobility (hypomobile).
- feeling specific mobility of the joint capsule to determine what particular "corners" or angles of movement need to be stretched and/or compressed in a particular manner, or not.
- response to joint mechanoreceptor stimulation.
- determine if there is joint or neuromyofascial resistance to passive movement (more details immediately below).

TOC is first performed in the barrier-free, "loose-pack" position of joints and soft tissue. By slowly enlarging the diameter of the circular motions, one will start to encounter resistance to movement, which, as another assessment progression, is described next. (Instructions on how to perform TOC with clients will be discussed in Chapter 5).

Resistance to passive movement (R1-R3)

Also referred to as "dynamic tissue tension" above, resistance to movement in FST uses a designation that is familiar to many manual therapists. Eminent physiotherapist Geoffrey Maitland extensively described and categorized the phenomena of resistance to passive movement, as evaluated by the manual therapist. He developed what he called a movement diagram, as well as a pain diagram to accompany it. Maitland called the first, minor barrier one encounters during passive movement testing of spasm-free resistance "R1". The next one is called R2, with this resistance characterized as limiting further movement unless more force is used to push past this barrier. R3 was created and defined by the authors as the last, usually painful, barrier to movement, called the anatomical end range of motion. In this book, the reader is advised and will be instructed never to go past R2 with FST assessments, treatment or exercise prescription.

The concept of R1-R2 can be easily understood by experiencing it on one's own finger. We use this when explaining what makes FST different from other kinds of stretching and jokingly call it the "Frederick Finger of Fascia". Follow along in the accompanying photos.

Figure 4.2a Point one finger up; push with other finger until barrier felt (R1)

Figure 4.2b Now grasp finger, pull up to ceiling

Figure 4.2c Keep traction as you assist finger extension to next barrier (R2)

Figure 4.2d Notice 2–3 times more gain in ROM

TOC is used to assess the quality and quantity of R1-R2 movements and to gain further insight as to whether tissues are responsive or not, hydrated or not, injured or not and so on. For example, tissues that rapidly respond favorably to these

movements indicate that FST would be an optimal solution for a particular tissue or fascial line problem, usually within that session. This information will determine how to further individualize the session for best outcomes.

Resisted movement (FST-PNF)

As stated in Chapter 1, the Proprioceptive Neuromuscular Facilitation technique of hold or contract-relax as used in stretching has a long research history of having the most favorable outcomes for increasing ROM when compared to static and self-stretching. It was also explained that FST uses a modified version of this technique (called FST-PNF) to add resistance before an assisted stretch is applied. The following outlines the steps used in the example of a straight leg stretch of the hamstrings:

- Therapist passively moves client's leg to R2 and instructs client to inhale and push leg down to table against the therapist's hand.
- Therapist allows client to ramp up contraction by permitting up to three degrees of initiating movement.
- After initiating movement, therapist resists further movement so that further movement becomes an isometric contraction of the hamstrings within the Superficial Back Line of the leg.
- Client stops the isometric contraction and relaxes when he or she needs to exhale.
- Upon exhalation, therapist passively performs longitudinal traction before stretching into the available range up to the next R2 barrier.
- Classically repeated three times, the number of repetitions is in reality individualized such that when no further gains in range are realized, the stretch at this particular angle is ended and a new angle is chosen.
- The above is repeated at that new angle if indicated.

Information gained during an initial assessment of using FST-PNF includes in general, the quality of neuromyofascial chain engagement/disengagement, and in particular:

- Activation/deactivation quality of targeted myotomes and other muscles within chains.
- Determine what tempos (along a spectrum of slow to fast) work best to achieve goals, for example, increasing ROM.
- Determine what durations work best.
- Determine what frequencies work best.
- Determine what intensities work best.

FST-PNF is used as an assessment, as treatment and as training. As an assessment, it is used on new clients and at any time a new problem or condition warrants an evaluation to solve a problem. However, as maintenance therapy or training, FST-PNF is used primarily to obtain greater increases in end-range neuromyofascial chain activation, strength and/or ROM. The next chapters provide a thorough description of the practical FST technique for readers to use with their clients.

Summary

This chapter is essentially about implementing palpatory literacy in a logical sequence of quick and accurate manual assessments in order to guide you to more effective treatments and improved outcomes.

After reviewing the details of using the familiar SOAP format, we broke it down further into a general strategy of assessment of testing tissue by using START (Symptom reproduction-Tissue tenderness-Asymmetry-Range of motion quantity and movement quality-Tissue texture changes). Specificity of accurately and rapidly treating and re-assessing was highlighted in our description of SITTT (Scan-Identify-Treat-Test-Treat again). Detailed, practical examples were provided to help guide you in learning the process. The testing part of SITTT was further sub-divided into using LSS (Lengthen-Shorten-Stabilize), a quick method of testing to see if imposing immediate change to a region of biotensegrity will affect function positively, in order to quickly direct your treatment.

A discussion of assessment flow followed, directing you to try using SITTT to get positive global before local response to treatment and then move from static tests to dynamic tests of function. We provided a logical ordering for this by using PMJN (Posture-Myofasciae-Joint-Nerve) as the preferred sequence of assessment.

Table based assessment was then introduced starting first with passive movement testing using TOC (Traction-Oscillation-Circumduction). TOC is the foundational pattern of passive joint and neuromyofascial movement response. We discussed resistance to passive movement, describing how to use the concepts of R1-R3 to help guide you to accurately assess tissue dynamically. Resisted movement using FST modified PNF (FST-PNF) was then discussed in detail so as to provide you with a good foundation to understand and practice manual techniques in the following chapters.

Reference

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Section 2

Chapter 5 — *Lower Body Technique*

Key concepts for technique

- *A* — *General Assessment*
- *B* — *Range of Motion Evaluation Warm-up and FST-PNF Stretch – Bent leg single joint*
- *C* — *Range of Motion Evaluation, Warm-up and FST-PNF Stretch – Straight Leg and Multiple Joints*
- *D* — *Range of Motion Evaluation, Warm-up and FST-PNF Stretch Side-lying*
- *E* — *Lateral Line*
- *F* — *Repeat Entire Series on the Right Leg B through D*
- *G* — *Pelvic Stabilization and Sacral Set*
- *H* — *Lunge: Back/Hip/Knee Extension, Ankle Dorsiflexion – Gastrocsoleus – SBL Lower Leg Standing*

Chapter 6 — *Upper Body Technique*

- *A* — *General Evaluation*
- *B* — *Side Lying*

C Range of Motion Evaluation Warm-up and FST-PNF Stretch
D ROM Evaluation Warm-up and FST-PNF Stretch
E Sitting Stretches
F Floor Stretches
G Standing Stretch

5

Lower Body Technique

Key Concepts for Technique

Introduction

For experienced therapists some of the concepts in this chapter will be familiar. Nonetheless, we felt it crucial and necessary to include them. We share our philosophy, tips for success, proper body mechanics, and specific instructions on how to best perform our technique. We use our Ten principles (described in detail in Section 1) to correlate these concepts for better understanding.

The ten fundamental principles of FST

1. Synchronize **breathing** with movement.
2. Tune **nervous system** to current conditions.
3. Follow a logical **order.**
4. Achieve range of motion **gain *without*** pain.
5. Stretch **neuromyofascia,** not just muscles.
6. Use **multiple** planes of **movement.**
7. Target the entire **joint.**
8. Get maximal lengthening with **traction.**
9. Facilitate body **reflexes** for optimal results **(PNF).**
10. Adjust stretching to current **goals.**

All of the principles are applied to the technique and are not done in any specific order. When we teach our hands-on workshop we demonstrate the practical relevance of these guidelines. They are not just theoretical but have an extremely useful application as well. The philosophy and theory of the principles were described in Chapter 2. Here they will be outlined differently for the specific practice of FST technique.

If you truly embrace all of the principles when you perform the technique, you will have excellent results. They have stood the test of time for us personally and thousands of our students!

A term we use is the StretchWave™. This is a metaphor used to help people visualize a stretch as being made up of undulations of movement coordinated with proper breathing. This metaphor comes from observing that many physiological and kinesiological processes in the body occur in waves, from the light waves that stimulate the retina in vision to the pulsing waves of the blood in arteries and veins.

Practical guide to implementing the Ten Principles

NOTES
You are referred back to Chapter 2 if you need more details on any principle.

1. Breathing

Breathing is a crucial component in successful stretching, for both the client and the therapist. Breathe together and be aware that if the therapist is not breathing well it often translates to the client not breathing as well.

2. Nervous system

We use a combination of movements we refer to as TOC in order to "talk" to the tissue. This stands for: traction, oscillation and circumduction. It uses a combination of breathing cues to either relax (down regulate) or excite (up regulate) the client's nervous system. TOC is used in a slow or fast manner, just like the StretchWave!

Traction

Physically decompress and create space in the joint using your hands or body. Contact with entire neuromyofascial net through traction lengthens the tissue.

Oscillation

Movement that has a vibratory effect with a rhythmic motion: it can be back and forth, side to side, up and down, in and out or any combination of those. It can be used to calm down a nervous system, moving the client into the parasympathetic state or amp up a nervous system shifting the client into the sympathetic state. Most pain that may arise from factors like unintentionally over-stretching or pinching a structure may be relieved in seconds with immediate oscillation.

Circumduction

There are six reasons why we use circumduction in FST:

1. To warm-up and thin out synovial fluid in the joint.

2. To assess the feel of the joint and possible impingements.
3. To assess feel of the tissue and check for imbalances.
4. To see if the client is going to give up control and allow us to move them.
5. To increase overall relaxation in joint and entire body.
6. To build trust and rapport with the client. This is very important!

Smooth oscillations calm the nervous system.

Jiggling, gyrating, yanking movements are jarring to nervous system.

Rapid movement wakes up the nervous system.

3. Order

- Begin at the core of the body to unlock the restrictions first before moving to the extremities.
- Stretch one joint muscles (e.g. bent knee) before two joint muscles (e.g. straight knee).
- Start at the deepest innervated structures of the body – the joint – and progressively move all the way through to the distal ends of neuromyofascial chains.

4. Gain without pain

- The risk of causing pain means possibly losing trust and potential injury. There should be a stretch awareness, but never pain.
- "No pain, no strain!" is one of our fundamental credos. Movement is gained through finesse, not force.
- Less is more – don't overstretch and cause the rebound effect.
- We believe that it is important for the client to understand what a good stretch should feel like and not that it should ever hurt.
- You always want client making "aahs" (happy sounds) before they make "oohs" (stretch awareness).

5. Neuromyofascia

Consider the following when practicing FST:

- Think neuromyofascia and shift out of the mindset of engaging with specific muscles.
- When stretching, think global not local. Consider entire continuities of neuromyofascial lines and all the tissue contained within, not just isolated regions.
- Look at the body from a three dimensional perspective – from the inside out. Think: micro-macro and macro-micro.

- The irrefutable fact that it is impossible to separate one tissue from another – it is all intertwined and interdependent.
- Think of adding layers as you stretch into and across tissue: joint capsule, one joint, multiple joints, fascial, neural: all the way to two or more therapists stretching a client along multiple planes, in opposite directions.

6. Multiple planes of movement

- Explore all possible movements – remember it is a dance!
- Play with angles to find all of the tight fibers.
- Change the angle or level to find different fibers and tissue restrictions.
- Move in 3–5 degree increments around the body, like the sweep hand on a watch.

7. Joint

- Proprioceptively the knee specifically needs contact – hand and or body. placement around the knee – for a sense of security. This makes the joint feel safe and stable, rather than hanging unsupported in space.
- Gently cradle the knee instead of grabbing or gripping it.
- In side-lying moves, make sure you are supporting the client's knee and ankle (keep in line with knee-femur and tibia).
- If the joint has been stretched open for a while, then close it; or if it has been closed for a while, open it. Joints don't like to be in one position for too long.

8. Traction

"When in doubt, Traction It Out!"

Traction is the cornerstone of FST. Consider the following features and benefits:

1. Opens the joint capsule and space, decompresses the joint.
2. Creates conditions for optimal mobility of all joint structures.
3. Releases adhesions in joint capsule and other connective tissues.
4. Achieves neuro-reflexive release of the joint capsule being tractioned, as well as neighboring structures – some of which may also cross that joint.
5. Increases endorphin release.
6. Reduces pain.
7. Allows maximal lengthening of all the connective tissues.
8. Eliminates joint compression (jamming or pinching) while stretching.
9. Targets fascial components deep inside joint capsule, ligaments, tendons, muscles and neural tissues.
10. Dramatically improves the effectiveness of ROM increases and flexibility

gains.

Traction points:

- Use traction in all positions to find ROM.
- Use your body to traction and very rarely your arms.
- Use it to transition and move from one position to the next.
- Slow down, make sure your angle/position is correct for both you and your client.
- Traction can be done at varying degrees and angles – through multiple planes.
- Hand placement during traction (i.e. under versus over) is important, especially during the straight leg segment.
- When tractioning through any joint, make sure to target only the intended joint and be cautious of hyper mobile joints.
- We like to say "When in doubt, traction it out!". This means use traction when:
  - the client feels joint or tissue pinch
  - you forget what to do next
  - the client cannot relax
  - the client gets a spasm, etc.

Don't use traction on acute injuries and in conditions of hypermobility or laxity.

9. PNF

Described in detail earlier, it is the flowing dance of two people and their respective neuromyofascial systems moving in therapeutic harmony. Each dance is unique to the therapist and the client. Use of specific simple cues (verbal, tactical, importance of hand placement). It is key not to touch the opposite side of the body or you send a neurological signal to the wrong area.

10. Current goals

- Know what the current goal is and keep treatments on track with it.
- Change the goals in order to continue moving ahead to successfully achieve them.
- Adapt sequencing to your client and what their tissue needs are at a particular moment, not to what's on your agenda.
- Apply asymmetrical dosing of stretching, for example, 2:1 (or, if needed, 3 or 4:1) ratio to correct side-to-side ROM imbalances, where ROM unilaterally is remarkably decreased.

Range of motion evaluation

Explanation of resistance of the tissue feel

The purpose is to get a passive sense of soft tissue resistance to movement and to identify the type of tissue (joint capsule, ligament, neuromyofascial unit or chain) that is responsible for movement restrictions or other aberrations. The purpose of the ROM assessment is to get a sense of when soft tissue starts to resist the passive movement being directed by the therapist. The first response of passive resistance to PROM is called Resistance 1 or simply, R1. This occurs when the therapist feels or senses the first barrier encountered, as one takes up increasingly more PROM. R1 can occur at the relative start of the ROM or may occur toward the expected end or anywhere along that spectrum. The feel of R1 can be soft or hard or somewhere in between. It can have a gooey, almost non-descript feel, as in some long practicing yoga practitioners who have reduced the gamma gain of the muscle as well as over lengthened their connective tissue by excessive stretching. R1 in this body type will occur toward the expected end of the ROM and in some, it will actually coincide with the anatomical limit of joint motion. On the other side of the spectrum, R1 can have a wiry, guitar string feel, such that it springs into your hand almost suddenly, which usually occurs at the relative beginning of the ROM. We generally see this in the following client types: highly strung, massively stressful life, cannot give up being the one in control, highly nervous and or anxious, distrustful. Many disorders of the nervous system or some diseases of the connective tissue system may also have these or similar characteristics, but those topics are beyond the scope of this book.

R2 or Resistance 2, is the second response to the PROM evaluation. After you note where R1 occurs, proceed to increase the ROM until you feel the tissue suddenly start to slow down the movement. Any further movement after this point will elicit maximal resistance (R3) from the tissue (and probably a look of pain or high alert from the client) and possibly a reflex reaction that contracts the muscle to prevent further lengthening of the tissue. Naturally, this scenario is undesirable and can be avoided if the therapist is attentive to the feel of tissue under tension, as well as to the reaction and response of the client.

Resistance to Traction (RT) occurs during the actual stretching phase of the session, not during the evaluation or ROM phase. RT can conceptually be thought of as "enhanced R2", meaning that the second barrier felt during PROM is explored with the addition of two simultaneously occurring components, traction and increased ROM. For example, when working to increase bent knee hip flexion at R2, we first micro-traction then add more flexion while maintaining the traction.

- Move into starting position for ROM without being in a rush to get into the stretch.

- The ROM check needs to be just that, a check – no stretching yet.
- It needs to be the client's end ROM, not what is shown in the book.
- Know where R1 is for your client and stay there during the evaluation and warm-up. Check in with your client if you are not certain.

Breathing technique

The importance of using the breath to maximize gains in the tissue and also to help control the desired nervous system is the second of the ten principles. This can be easily achieved by the therapist and client breathing together to achieve synchronized movement and flow. The basic rule with FST is to exhale into all movements, be it finding the ROM or into the stretch post PNF contraction. An inhalation is taken for both the brief concentric and then isometric contraction component during PNF.

The following is a detailed explanation of how FST-PNF is performed for the first move in the routine. We use part of the Superficial Back Line as one example, which targets the gluteus maximus and proximal attachment hamstrings. It represents how it is executed through the entire technique.

PNF technique

This technique uses a modified form of PNF we call FST-PNF to help differentiate it from traditional and other forms of PNF. In FST-PNF, the client contracts targeted muscles with as little as five percent of their strength and up to 20 percent (versus traditionally 50 –100 percent) and holds the contraction for approximately three to four seconds (versus six to ten seconds), for a more effective relaxation response. We use comfortable straps to stabilize the limb that is not being worked on, thus facilitating complete relaxation of the person being stretched and enhancing the effectiveness of the actions of the therapist.

Other key differences are that traction is used to assess the ROM in the tissue before the stretching begins. It is also gently used throughout the stretching. Pain is never allowed and is considered a negative response. The therapist and client move together as if in a dance, with perpetual undulating movements through the session. For a list of 18 reasons that make FST-PNF different, please see principle 9 in Chapter 2.

FST-PNF sample sequence

1. Begin with the client's leg placed comfortably on your body, draped over your shoulder and with the weight of their leg resting on your back. Their other leg is normally secured by stabilization straps for this routine.

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.

2. Make sure your own body mechanics are good (you are also relaxed and in a comfortable position).
3. The client and therapist both inhale together. You will breathe together for the entire session.
4. Using your body (not just your hands) to lift their leg, traction their femur up out of the socket and then take their leg into their barrier of resistance called R1 (described previously). Their knee remains bent, as the focus in this case is proximal tissue.
5. The therapist gives a gentle hand tap to the back of their hamstring for the PNF cue. Ask them to inhale and press back and meet your resistance. The client performs a slow and gradual concentric contraction of the hamstrings and gluteus maximus for just a few degrees of movement into hip extension and with as little five to twenty percent of their strength for the duration of the inhalation.

   The reason there is such a large variance in the percentage of the contraction is because it depends on the strength of the client as well as the therapist. The area of the body being targeted also influences it; for example the neck will use a lighter contraction than the leg. Finally there is a spectrum of contraction intensities that the therapist will need to experiment with in order to find the best response to whatever the intent is – increase ROM, reduce tone, etc. This "experiment time" is greatly reduced with practice and experience.
6. After the concentric contraction is performed for a few degrees, the client continues the same inhalation while being cued to hold an isometric contraction, as they firmly meet the resistance provided by the therapist for about two more seconds. The contraction is then ramped down smoothly until the targeted region completely relaxes.
7. On the exhalation, the therapist increases the traction of the femur upward out of the hip joint and creates space between the pelvis and the femur, maintaining the traction while increasing the stretch to the next tissue barrier, called R2.
8. This is where the concept of the StretchWave is used – like the rise and fall of a wave. The traction up is the rise and movement forward into flexion is the fall.
9. Increased ROM in hip flexion is gained by hooking and carrying the femur upward with your body and hands, thereby enabling deeper and further hip flexion motion. This should look like the StretchWave (described in Chapter 2). The traction should be applied at the peak of the wave movement. Flowing

into the new found ROM is likened to the sea washing over the shore after the wave builds into a peak. Use words like “up, out and down" when you move in unison with your client.

10. Repeat PNF two or more times as indicated by client response, moving a few degrees out into abduction with each PNF pass to a new angle and targeting different, adjacent fibers of tissue.

Repeat the series until you have moved through all the possible angles and fibers to get an optimal fascial stretch of the tissues. Remember: never cause pain or push past appropriate levels of indicated stretch movements. Less is more and patience is important. Always listen to the client’s tissue!

The treatment table routines in Chapters 5 and 6 are presented the way we progress through an actual session with a client. They can be done in entirety or in smaller segments for emphasis. What makes the patterns unique is the flow and sequence of movements from the core of the body out to the extremities.

There are also several signature moves such as the “Sack of Buns” and the “Glute Swoop.” While developing the technique in the world of athletics, I discovered that it was all about unlocking the tightness around and in the hips. This is why I focused so intently on the four key muscle groups of the lower body. This group consists of the gluteal complex including the six deep rotators, ilio-psoas complex, quadratus lumborum, and latissimus dorsi.

Tips for the therapist’s success

The two most important tips are

1. Listen to your intuition and never, ever go against your gut feelings!
2. Our brain is wired for survival first and foremost, so it is imperative the client always feels safe and that the therapist is never perceived as a threat. Trust takes time to develop and can be broken in an instant.

More tips

- Less is more. You can always increase the stretch but it is difficult to undo over stretching.
- It takes time and patience to learn to listen and understand the tissue. Go easy on yourself and your skill level. It has taken 30 years to develop this technique and we are still learning every single day from each client and student!
- Patience and practice… slow down and keep listening.
- Listen with your heart, not just your brain to tune into your clients’ bodies.
- Don't let your eyes do all your seeing; close them and see what happens.

- When you are in the right position, the stretch movement comes naturally and just flows. If not it feels awkward to you and to the client!
- Remember to visualize the StretchWave throughout the session. Think of moving heel to toe (like tai chi movement) as you move through the stretch wave.
- If you feel like you're working too hard, you are.
- It takes energy, patience and skill to pay attention – not just physical force.
- Own the technique. Play with it. Keep it within the general context and make it yours.
- Remember, we are just bringing our client's bodies back into balance.

Communication

- Work *with* your client not against them. Therapist intent is a crucial component. Know the power is in listening and working together as a team.
- Be clear in your intention.
- Be clear about the client's goals or concerns for each session. Check in with your client.
- Pay attention to client's verbal cues, facial expressions and body language.
- Let the client's tissue tell you what it needs. It will talk to you; your job is to listen.
- Don't let the client convince you to deepen a stretch because they think they can go farther when your sense is that the stretch is already at the correct intensity for the best results.
- Be clear and simple in your cueing of PNF.
- Ask for feedback from client. Give communication cues to get specific information:
  Where do you feel that stretch?
  On a scale of 1–10…
  Any pinching?
- Use different ways to elicit feedback (because people don't necessarily know what they're supposed to feel like or be experiencing).
- There is a difference in brain wave patterns between talking and silence. Encourage clients to be where they need to be to accept what you're doing. If their eyes are closed, don't talk; listen to what their bodies are telling you... Let them find their happy place.

Body mechanics

The golden rule is: if the therapist feels comfortable and relaxed in their position and the client is relaxed and not in pain – everything works.

Make the technique your own and don't worry about getting into the perfect position as this will change depending on the size and flexibility of each client as well as the therapist.

Personal adaptations

- There are no exact hand or leg placements for the therapist. Position yourself for your ease and comfort. Find what works for you. If you are uncomfortable or in pain the client senses it, and is unable to relax.

> **NOTE**
> Please note that the majority of the photos in the technique section show a petite therapist and a tall client. The instructions are also for the biomechanics of petite therapist and a tall client. Therefore make necessary adjustments of table height, body mechanics and client positioning to make it work for you.

Position tips for body, leg and hands have many possible variations:

- The closer your body is and the more contact you have with the client, the better you will be able to read the tissue.
- Use your whole body (feet, hip action, etc.) – not just your hands. This enhances the client's sense of security and thus their ability to relax.
- Always adapt your own body positions according to each client. Your positioning may change depending on the size and flexibility of your client.
- Positioning: is KEY – small adaptations can make a huge difference.
- Use soft, relaxed hands. Don't grip roughly .
- You are not just moving your client, you are moving with them.
- For better results, less soreness and fatigue in your own body, use leverage rather than pulling and pushing (strong arming) your client. Always release the stretch through a neutral pathway and a different plane – don't re-contract what you have just lengthened.
- Remember always: Finesse not force.

The text in Chapters 5 and 6 is broken down into logical steps for you to follow:

Goal: What is the intent of the specific movement and target tissue?

Client position: What is the position of the client on the table (or couch)?

Therapist: What is the therapist's position and what do they do?

ROM: What is the movement needed to find ROM?

Traction: What is the target area and how does the therapist achieve it?

PNF: What does the client do?

PNF cue: What does the therapist say to the client to verbally cue contraction?

Stretch: What is the target area? What is the movement needed and what does the therapist do to increase the stretch or vary other parameters?

For simplicity's sake, we have placed all of the same key components at the beginning of this chapter. They apply to the entire technique of the FST system outlined in the rest of the chapter. So, for instance, instead of writing the breathing cues for each stretch they are stated once from the start. The same is true for PNF sequences.

Practical Section

Nomenclature:

The following practical part of this book contains a flowing routine that can be used in part or in full. Each stretch movement and/or procedure are named accordingly by: stretch position of the body or limb - list of targeted tissues – list of targeted fascial lines.

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.

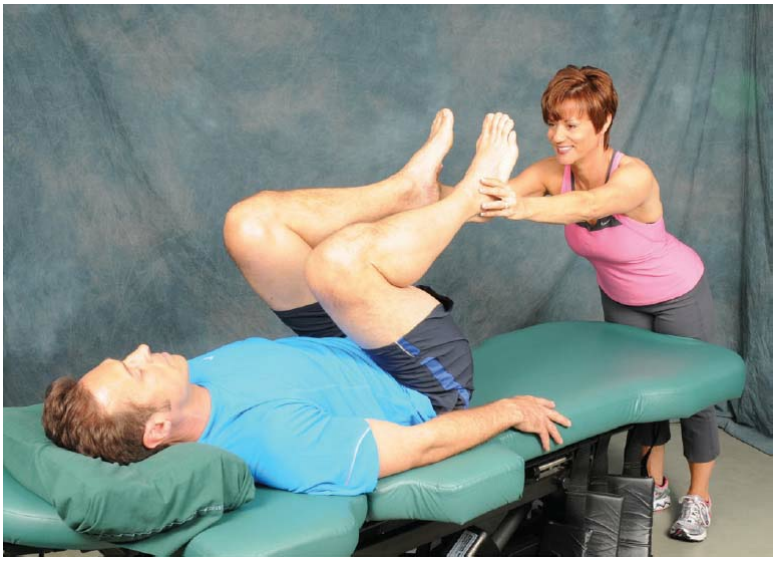

Figure 5.1a Hip clearance

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.

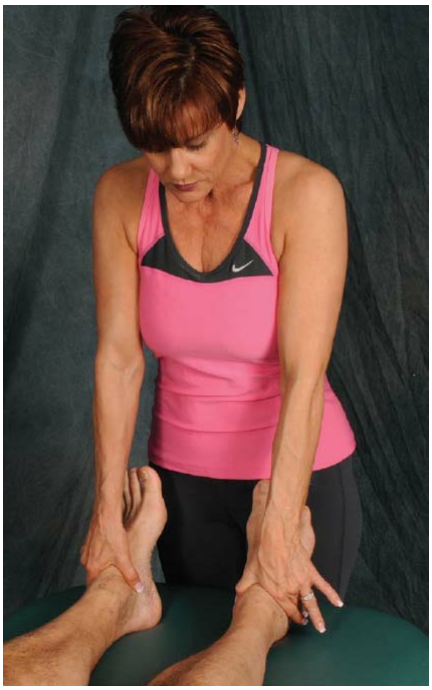

Figure 5.1b Leg length check

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.

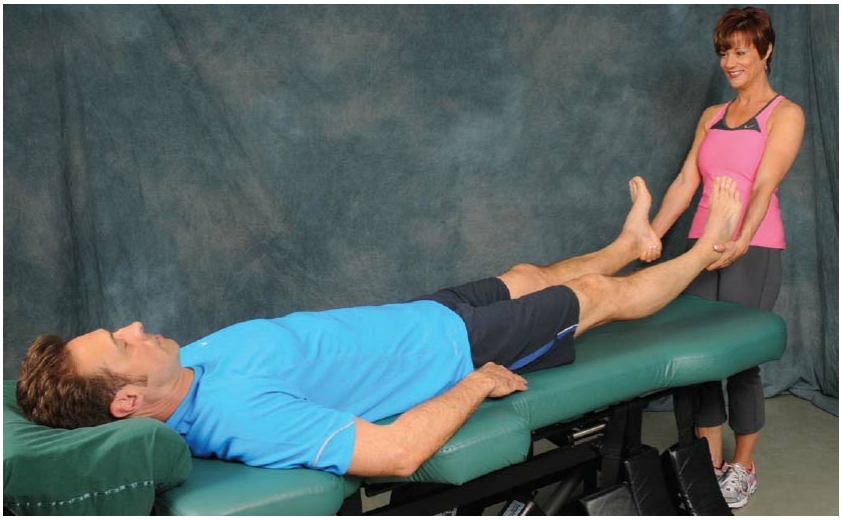

Figure 5.1c Double leg traction

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.

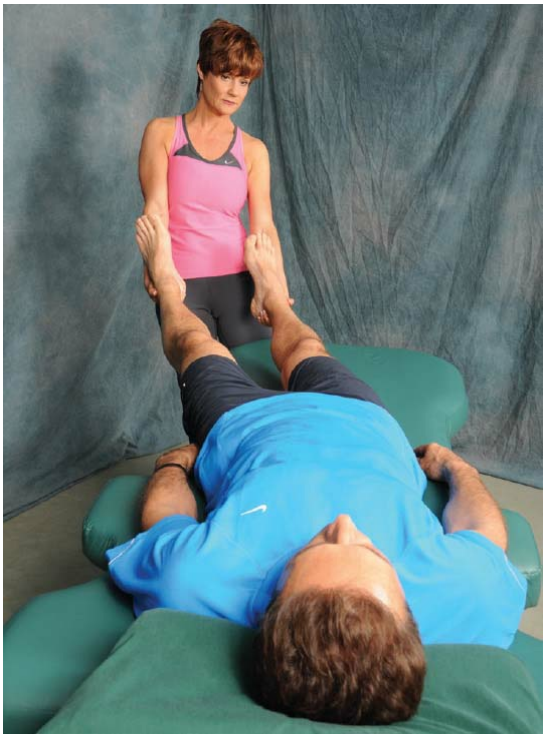

Figure 5.1e Lateral line check – walking to right

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 left leg higher, holding at their heel.
- Place your other hand on the outside of the right 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.

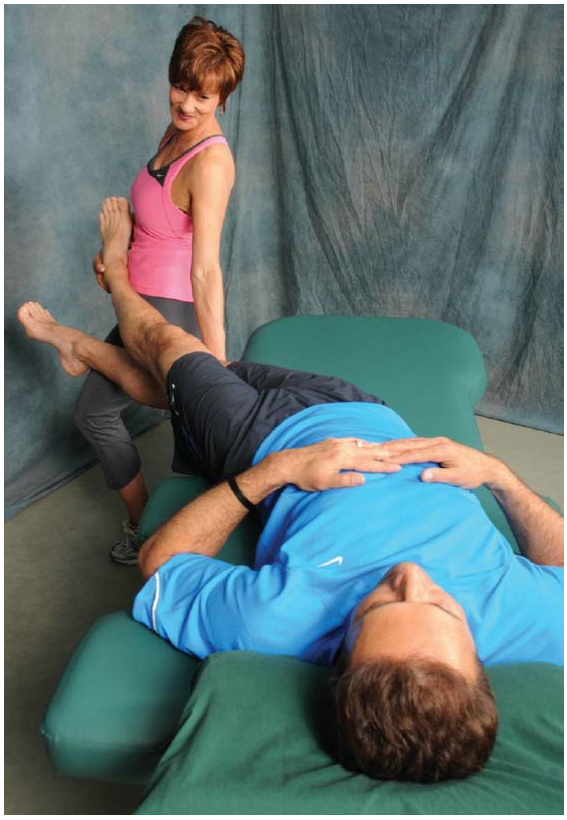

Figure 5.1f Lateral line with crossed legs

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.

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 one or two straps above the knee and one or 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

Therapist:

- From the last position, stand up and get into a lunge position with your outside leg forward and your inside leg at the back.
- Lower your torso towards the table to get up under the client's leg.
- Slide your left (inside) shoulder into the back of their knee and wrap the rest of your arm around the leg, securing without squeezing it.
- Be careful not to hit any trigger points with a bony shoulder (you may want to ask them).
- Hold onto the side of the table with your right hand.

ROM: Changes by increasing hip flexion.

Traction: Traction up (out of socket and toward their head).
Lift their leg up using your legs and torso and not just your arm.
To increase the traction press down into the table with your hand as you use your legs to lift their femur up and out.

PNF:

- The client and therapist both inhale together and breathe together for the entire session.
- The therapist gives a gentle hand tap to the back of their hamstring for the PNF cue. The client performs a slow and gradual concentric contraction of hamstrings and gluteus maximus with as little five percent and up to about 20 % of their strength for about one second. They are allowed to move a few degrees into hip extension. The reason there is such a large variance in the percentage in the contraction is because it depends on the strength of the client as well as the therapist. It is also influenced by the area of the body being targeted, for example, the neck will use a lighter contraction than the leg.
- Then the contraction changes into an isometric one as it meets the resistance provided by the therapist for about two more seconds. The contraction then smoothly decreases in its intensity.
- On the exhalation, the therapist increases the traction of the femur upward out of the hip and creates space between the pelvis and the femur. This is where the concept of using the StretchWave™ is used (described at the start of this chapter) – like the rise and fall of a wave. The traction up is the rise and movement forward into flexion is the fall.
- Increase ROM in hip flexion is gained by lifting the pelvis and femur upward and moving deeper into hip flexion.

PNF cue: "Press your leg back into me."

Stretch: Increase hip flexion.

Target tissue – mobilized leg: posterior joint capsule, hamstring and gluteus maximus.

Secondary: bilateral groin (becomes primary target tissue in hypo-mobile clients).

Target tissue – immobilized leg: hip flexors.

Repeat: PNF two or more times moving a few degrees out into abduction with each PNF pass for a new angle and different fibers of tissue.

3. Hip/knee flexion with hip abduction – hamstrings, glutei, lumbosacral, hip adductors – SBL, FL, DFL

Figure 5.5c With increased flexion and abduction

Figure 5.5d Continue increasing flexion abduction

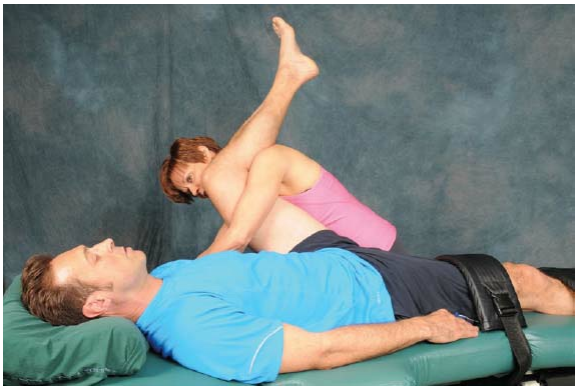

Figure 5.5e Finish in maximal hip flexion and abduction

Figure 5.5f Traction to finish

Goal: To progress from previous stretch by moving into more abduction, slight external rotation; additionally to target the antero medial joint capsule and tissues in the DFL: short adductors and proximal attachments of long adductors.

Client position: Same position.

Therapist:

- From the previous position – your legs are still in a lunge.
- Reach around with your left hand, grab the table for leverage and lean out with your body to move their leg into more abduction.
- Continue moving out to the side (from flexion, adding more abduction) until there is no more resistance in the tissue.

ROM: Progressive increase of hip flexion and abduction with some external rotation.

Traction: Femur up and out of their hip towards their head and then progressing out into abduction with some external rotation.

Use your shoulder and your body to guide the next position and use the table as leverage to increase your traction.
Remember your legs are creating the traction not your arms.
PNF: Same
PNF cue: "Press your leg back into me."
Stretch: Increase hip flexion and hip abduction, some external rotation. Finish moving out, down and around to bottom of table. Traction leg out at the bottom corner of the table to finish.
Target: Antero-medial joint capsule, proximal hamstring-adductor interface, bilateral hip adductors.
Repeat: PNF two or more times moving a few degrees out into abduction with each PNF pass for a new angle and different fibers of tissue.

4. Hip flexion, abduction and external rotation – medial hamstrings and short adductors – SBL, FL, DFL

Figure 5.6a Hip flexion, abduction, ER

Goal: Target tissues lying within the SBL, FL, DFL: medial hamstrings, adductors.

Client position: Supine with leg opened to side.
Therapist:
- From the traction at the bottom corner of the table.
- Place their foot in the crease of your hip.
- Place one of your hands under their ankle for support and the other hand on top of their knee, superior to the joint.

- Walk up slowly using your hips as you lunge forward to get into the next position.
- To begin with, keep their leg below a 90° horizontal abduction angle.
- Place your inside hand on their knee, your outside hand supports the ankle tucked into your hip.

ROM: Hip flexion and hip abduction.

Traction: Traction the client's femur out by leaning away from the table with your hips.

Hold the foot and move their entire leg without losing the angle.

Traction direction is out of the socket first to open the joint – femur away from pelvis.

Traction out then stretch up toward the top of table into deeper flexion.

PNF: Have the client contract glute/hamstring back towards your hip.

PNF cue: "Press your foot back into me."

Stretch: Increase the hip flexion first and then abduction second.

Target tissue: Medial capsule, medial hamstrings and short hip adductors.

Repeat: PNF one more time.

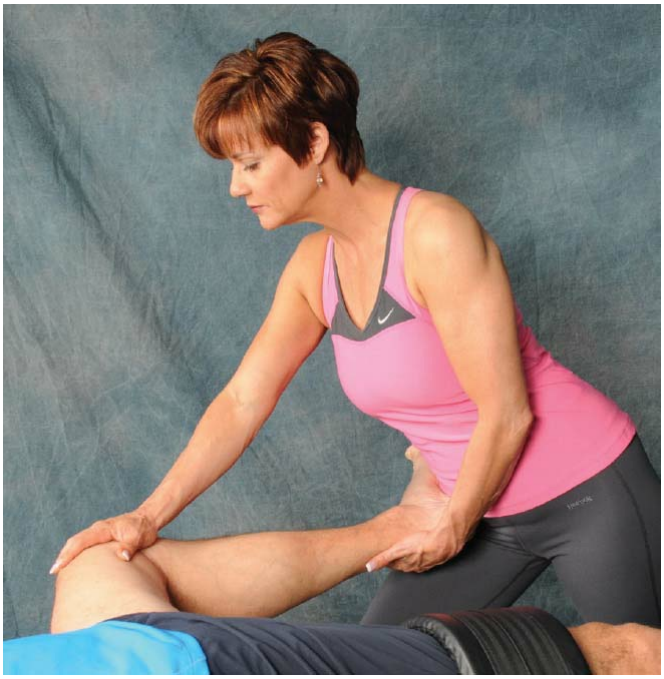

Figure 5.6b Short hip adductor focus

From the last stretch we now focus more on the adductors.

5. Hip flexion, abduction and external rotation – medial hamstrings and short adductors – SBL, FL, DFL

Goal: To target tissues lying within the SBL, FL, DFL: medial hamstrings, short adductors.

Client position: Supine with leg open into abduction.

Therapist:

- From the previous position the focus moves to the DFL, FL and short adductors.
- Your legs remain in the same position but change your hands so your inside hand is now supporting the client's ankle and your outside hand is on the medial aspect of their femur.
- Keep the leg at a 90° angle and use your hips to traction out.
- Drop your body weight down to increase the adduction.
- Remember to use your body and allow the stretch to occur. Don't just push the leg down with your hands.

ROM: Increase ROM by increasing hip abduction and then *flexion.*

Traction: Direction is out of the hip socket to open the joint by moving the femur away from the pelvis.

PNF: Have the client contract their adductors.

PNF cue: "Press your leg up into my hand toward the ceiling."

Stretch: First increase hip abduction by moving femur down towards the floor.

To further increase the stretch, place your hand closest to the table on their opposite hip and your other hand on top of their knee.

Then increase the hip flexion by moving femur up towards the top of the table.

Repeat: PNF one more time.

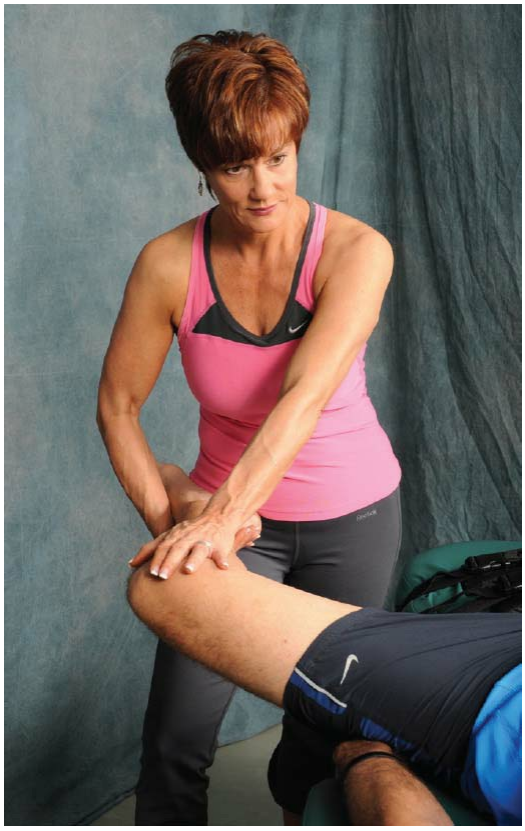

Figure 5.6c Rock back and forth into flexion and abduction

- Play with the combination of hip flexion and abduction.
- See if there is a bit more potential in the tissue to release.
- Remember to use your breath and your entire body – not just your hands - when doing the stretch.
- Return the hip back to a closed position by adducting it back to neutral.

Transition: Walk around to the other side of the table and traction leg across the client's body to begin the next stretch.

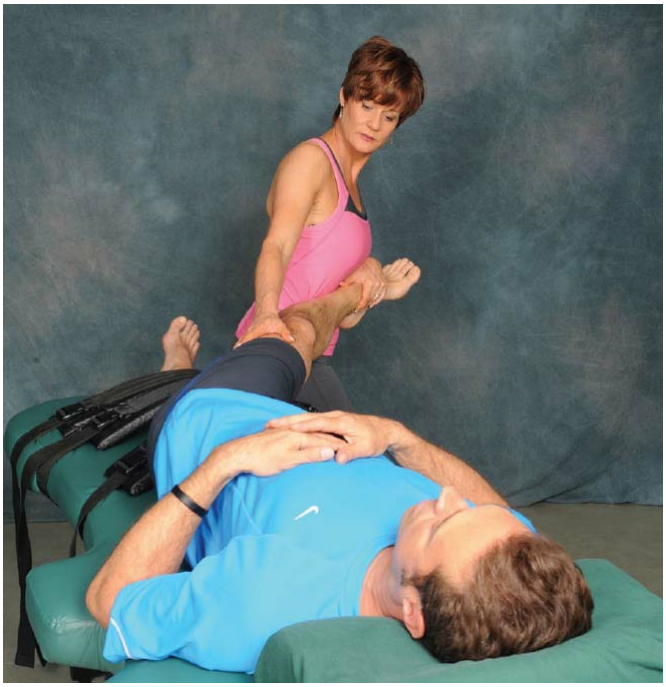

Figure 5.7a Lateral traction across the body

6. Low back /thoracic rotation – thoracolumbar fascia, glute max, glute medius, hip capsule – SBL, SPL, FL

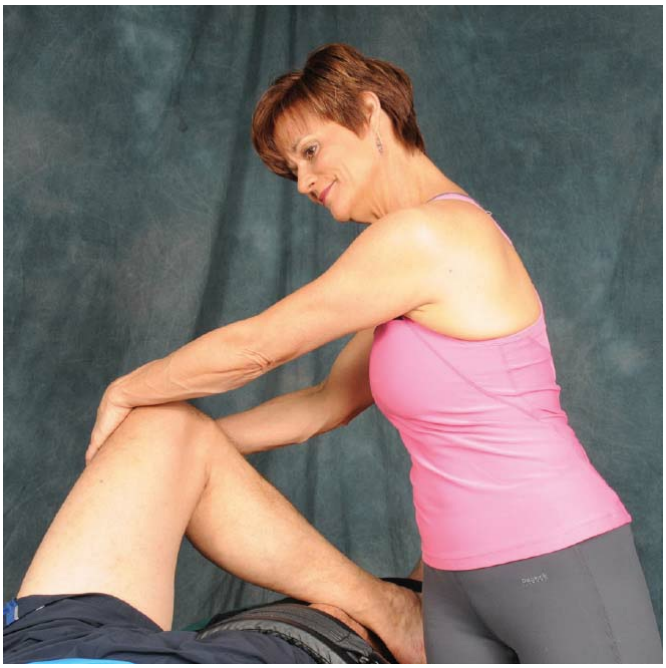

Figure 5.7b Low back preparation

Low Back Preparation

Goal: To target tissues lying within the SBL, SPL, FL: thoracolumbar fascia, glute max, glute medius, hip capsule.

Target: Thoracolumbar fascia, postero lateral hip capsule, posterior gluteus medius, gluteus maximus.

Client position: Supine with working leg crossed over stationary leg.

Therapist:

- Cross the client's bent knee and foot over their other leg and place it on the table if possible.
- To begin turn your body towards the client.
- Place your hands on both sides of their knee with one hand above and one below the knee joint.
- Using your body, gently rock their leg back and forth to mobilize and prepare tissues for the stretch.

ROM: Low back thoracic rotation.

Traction: Lift their knee up towards ceiling, then arcing toward you.

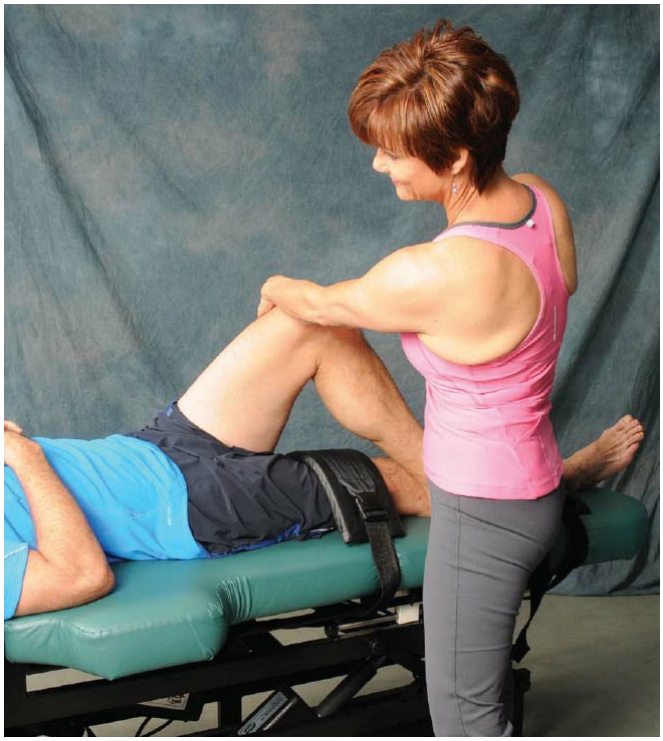

Figure 5.7c Rocking low back rotation with traction

Goal: To move the client's femur and pelvis up and over into rotation. Don't just drop the leg down toward the floor.

Therapist: Use your body to rock back and forth for warm-up – don't just move their leg!

Rise on your toes and then drop down into a squat – do the StretchWave!

ROM: Increase ROM by increasing hip adduction/internal rotation. Rock back and forth, into and out of ROM.

Traction: Up and over, hip and leg up toward ceiling before down toward table.

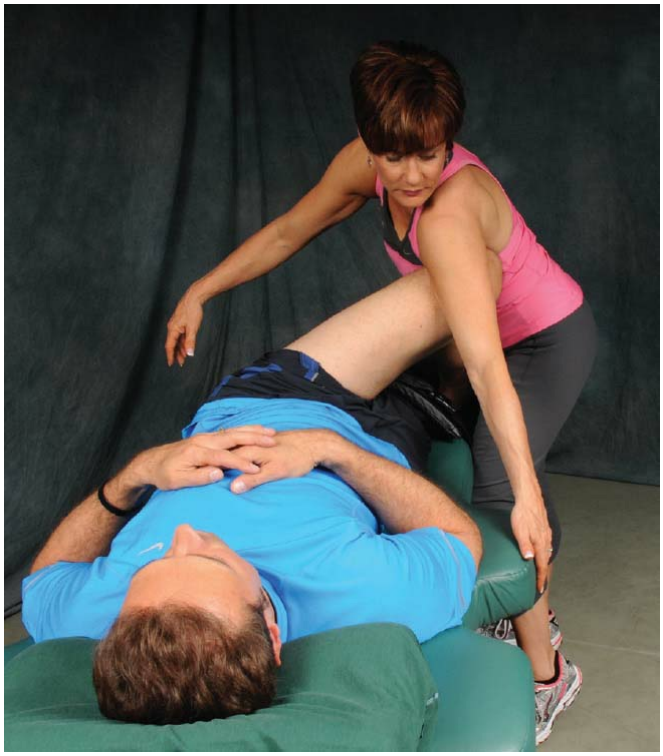

Figure 5.7d Low back arm reach

Therapist:

- Step down towards the foot of the table and drop your torso across their lower leg.
- Reach across with your left arm and swing it around to the front of their leg.

Figure 5.7e Low back rotation

Therapist: Reach out and grip underside of the table with left hand.

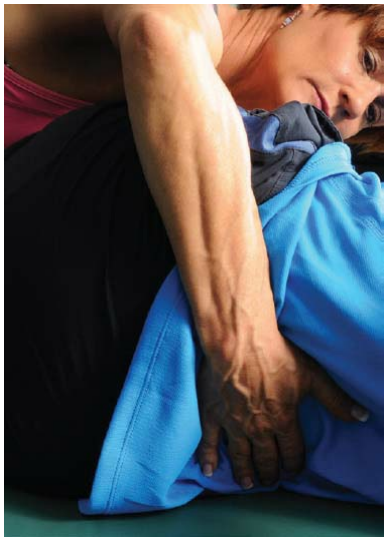

Figure 5.7f Hand position for low back

Figure 5.7g Low back stretch

Therapist:

- Legs in a lunge position with your torso dropped down onto the client's leg.
- With your right hand reach all the way to the other side of their sacrum and use your forearm as the fulcrum to cradle their low back. Press into the table with your left hand for leverage.
- Think of lifting their pelvis up and over.
- Focus on the lift not the rotation.

ROM: Increase hip rotation.

Traction: Use your torso to hug your client and your arms to lift their pelvis and femur "Up and Over".

PNF: Client will try to derotate their hips and low back down to the table.

PNF cue: "Roll your hips back down to the table."

Stretch: Increase the hip and low back rotation.

Repeat: PNF three or more times.

7. Traction across body

Figure 5.8a Lateral traction across body

Transition for next move. Traction their left leg across their body.

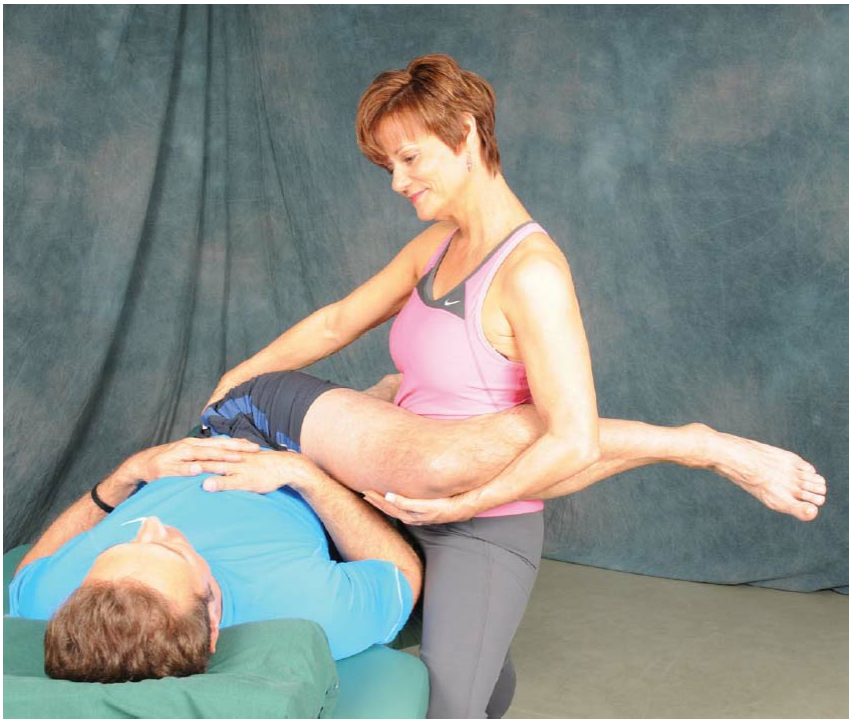

Figure 5.8b Thoracolumbar posterior hip

Figure 5.8c Close up of body position

8. Low back rotation, hip flexion, adduction – thoracolumbar, posterior hip - SBL, SPL,FL

Goal: To target tissues lying within the SBL, SPL, FL: thoracolumbar, posterior hip.

Client position: Slight rotation onto side with their left leg across body with bent knee.

Therapist:

- From the lateral traction across their body, step forward and wrap their leg around your body as you slide into position, hooking in behind their bent knee.
- Your right hand is lifting their pelvis up and your left hand is wrapped below around the medial aspect of their femur.
- Keep their knee lifted up and the leg supported and hooked into your body.

ROM: Thoracolumbar rotation and flexion of the femur.

Rock back and forth into and out of the range.

Traction: Pelvis up towards the ceiling and into rotation.

Femur out of the hip socket (towards upward diagonal).

PNF: Client contracts hamstring.

PNF cues: "Push your leg back into me."

Stretch: Increase the thoracolumbar rotation and flexion of the femur. Think of lifting their femur up towards the ceiling and out towards the corner of table.

Repeat: PNF two or more times exploring different angles and fibers.

9. “Sack of Buns”: thoracolumbar rotation, hip flexion, ER, knee flexion – thoracolumbar, QL, lumbosacral, hip rotators – SFL, SPL, DFL

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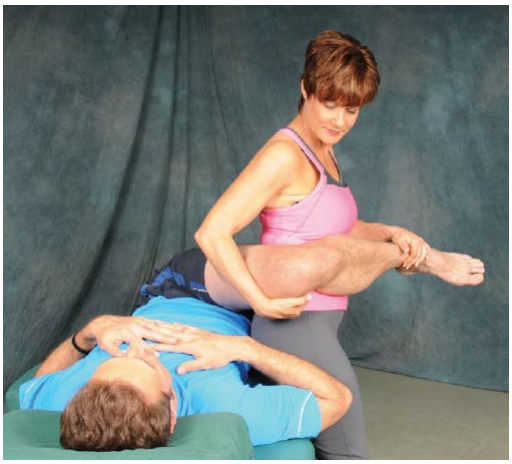

Figure 5.9a Sack of buns transition

Figure 5.9b Sack of buns beginning

Figure 5.9c Sack of buns stretch

Figure 5.9d Sack of buns max

Goal: To target tissues lying within the SFL, SPL, DFL: thoracolumbar, QL, lumbosacral, hip rotators.
To keep the client's knee lifted high and open up the entire area.
Client position: Supine with leg across their body.
Therapist:

- From the last position turn around and sit on the table facing away from the client.
- Wrap their leg around your waist or in a place that is comfortable for both of you.
- Your legs are in a wide stance.
- Switch your hand position and wrap your right hand under the medial aspect of their femur supporting their entire leg by holding it close to your body.
- Your left hand wraps around the lateral malleolus.
- Stand up and press your own hamstrings back into the table so it won't tip over.
- Lean away from the table with your torso by flexing at the hips.
- Bend your knees and tip your body toward your left foot.

- Press the right side of you pelvis up under their leg and increase your own lateral flexion by leaning away from the client. Keep at least one leg pressing against table.

ROM: External rotation of their femur and lower leg.

Traction: Traction is up towards the ceiling and the femur lifted out of the hip socket.

PNF:

Action 1: Client contracts to pull their femur into internal rotation.

Action 2: Client contracts entire leg into internal rotation.

PNF cues: Cue 1: "Pull your knee down to the floor." Cue 2: "Press your ankle up into my hand."

Stretch: Increase stretch by increasing their external rotation of the femur by lifting it up and pressing downward on the lateral malleolus.

Play with the amount of traction and variety of angles.

Get your right hip up and under their leg. Bend forward from the hips – and away!

Repeat: PNF two or more times.

From Sack of Buns, traction leg out for transition to prepare for glutes series.

10. Hip flexion, external rotation, adduction, knee flexed 45° – gluteus medius, piriformis – LL, SPL

Figure 5.10a Glute medius beginning

Figure 5.10b Glute medius stretch

Goal: To target tissues lying within the LL, SPL: gluteus medius, piriformis.
Client position: Supine with left leg bent across chest.
Try to have their knee towards the center of their chest if possible.
Therapist:

- Preparation and beginning position: Start at the bottom of the table and walk their leg up in to position.
- Allow their knee to bend, supporting their foot and moving their leg toward them.
- Place their foot in the crease of your outside hip or find a comfortable position for both of you.
- Keep their foot lower than their knee (i.e. toward floor not ceiling).
- Lean your body back to get into the position and stand up straight.
- Place your right hand on the back of their left knee and the other hand on the lateral ankle. Place their ankle in the crease of your hip for support and comfort.
- Keep their foot in the crease of your hip and below their knee.

Use your body and legs to increase the traction and the stretch – as opposed to using more pressure with your hands. The focus is on their ankle with gentle pressure down towards the floor, not on the knee.

ROM: Hip flexion and adduction.
Traction: Traction their hip upward as you move their bent knee down towards the center of their chest.
PNF: Get the client to contract the hip back into extension.

PNF cue: "Push your knee back into my hand."
Stretch: Increase hip flexion and adduction.
Bring their entire leg down towards chest.
With each PNF pass, move a few degrees across the fan of their hip.
Repeat: PNF two or more times.

Figure 5.10c Alternate hand position (for gluteus medius)

This is an alternate hand position especially if there is pinching in the front of the client's hip.

- Slide your hand completely under the pelvis and lift it up off the table.
- Try to put more emphasis on their foot – pressing downward.
- Remember the focus is on the ankle not the knee.
- From the stretch, continue the motion by swooping their knee down towards their opposite shoulder.
- Drop your body weight down on to their leg to keep the stretch going.
- Don't just push with your hands.
- Move very slowly as you continue down and around in a big circular movement.

Figure 5.10d Glute swoop

SIGNATURE MOVE

- Keep swooping.
- Release their leg from the swoop and let it straighten out as you walk backwards.
- Walk down to the bottom corner of the table.
- Finish with lateral traction across their body.

11. Hip flexion, adduction, external rotation, knee flexed 90° – hip extensors, gluteus maximus – FL

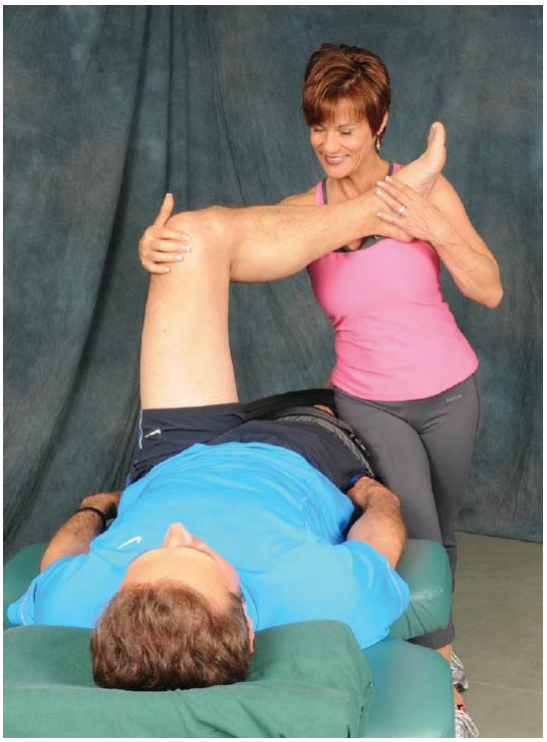

Figure 5.11a Glute maximus beginning

Figure 5.11b Glute maximus stretch

Posterior fibers of the hip

Reach your arm out and use your body to float up and move into a deeper stretch.

Goal: Target tissues lying within the FL: posterior fibers of gluteus maximus. Getting the femur toward their chest is the first goal and external rotation is the second goal.
Target all of the fibers in the fan of the hip.
Client position: Supine with their leg crossed over their body at a 90° angle.
Therapist:

- From the previous position of lateral traction at the end of the table, walk back slowly into the new position.
- Bend their leg into a 90° angle if possible in relation of the femur and the lower leg bones.
- Aim their left knee to the same (left) shoulder to start.
- Place the heel of their foot in the space between your anterior deltoid and pectoralis major on shoulder.
- Position of client's foot may be lower on therapist body depending on size of both.
- Place one hand lateral left knee and the other hand in front of their right ankle to hold it secure.
- Focus of hand on the backside of knees and your fingertips lightly touching.

ROM: Hip flexion.
Traction: Lift the femur up and out of the hip socket. Traction "up" (StretchWave towards their head). Place their foot on your shoulder to increase traction upward. Use your body rather than your hands to traction their leg up.
PNF: Client contracts their bent leg back into extension.
PNF cue: "Push your knee back into my hand."
Stretch: Increase hip flexion.
Getting the femur toward their chest is the first goal; rotation is the second goal. Targeting all of the fiber of the posterior hip.
With each PNF pass, move a few degrees across the fan of their hip.
Repeat: PNF two or more times. Explore all of the angles and fibers.

Figure 5.11c Glute swoop

- From the stretch, continue the motion by swooping their knee down towards their opposite shoulder.
- Drop your body weight down onto their leg to keep the stretch going – don't just push with your hands.
- Move very slowly as you continue down and around in a big circular movement.
- Keep swooping around.
- Release their leg from the swoop and let it straighten out as you walk backwards.
- Walk down to the bottom corner of the table.
- Finish with lateral traction across their body.
- From the bent leg series continue working with their left leg to complete the lines.

C. Range of Motion Evaluation, Warm-up and FST-PNF Stretch – Straight Leg and Multiple Joints

Multiple plane soft tissue ROM evaluation and stretch

- Move only to R1 for warm up.
- Exhale into all ROM increases.
- Use gentle StretchWave movements throughout.
- Move in three to five degree increments as you assess tissue; checking the ROM at each range moving in the circle, like a stopwatch smoothly ticking.

1. Hip flexion, knee extension – hamstrings – SBL, SPL

Use soft hands – no gripping, "If you are squeezing, you aren't pleasing!" Use their heel for the traction upward.

Goal: To target tissues lying within the SBL, SPL: hamstrings.
Client position: Supine with their extended leg up in hip flexion.
Therapist:

- Your legs are in a lunge position with your outside leg forward and your inside leg back.
- Place your right hand on the back of their heel and use it as the anchor point to traction the femur out of the joint and into the ROM.
- Engage your Lat for stability and strength.
- Place your left hand on the table for leverage.
- Think about getting underneath their leg to lift it upward.

ROM: Hip flexion.
Traction: Traction "up and out" (out of the socket and towards their head).
PNF: Client contracts their hamstrings into extension.
PNF cue: "Press your leg back into me."
Stretch: Increase hip flexion.
Repeat: PNF two or more times.

Figure 5.12 Hip flexion, knee extension – sagittal direction

2. Hip flexion, abduction, knee extension – medial hamstrings – DFL, SBL, SPL

Increase ROM and stretch by increasing hip flexion and abduction. Think of the client's leg floating smoothly out to the side and then down and around to the bottom of the table.

Goal: To target tissues lying within the SBL, FL, DFL: hamstrings and adductors. Continue from last position by increasing the ROM as their leg moves out and around to the side.

Client position: Supine with their leg in flexion.

Therapist:

- Your leg and right hand position remains the same.
- Move your left hand and place it behind their knee.
- Use your body to maintain the traction and increase abduction.

ROM: Hip flexion and abduction.

Traction: Traction up, out and open (out of socket, towards their head and out to side).

PNF: Client contracts their hamstrings into extension and adductors in slight adduction.

Figure 5.13a Hip flexion and abduction

Figure 5.13b Repeat PNF

PNF cues: “Press your leg back in to me.”
Stretch: Increasing hip flexion and abduction.
Repeat: PNF two or more times.

Figure 5.13c Hip flexion, abduction, ER

Traction their leg in a slightly more open abducted position.

Figure 5.13d Medial hamstring focus

3. Hip flexion, abduction, knee extension – medial hamstring focus – SBL, SPL, FL, DFL

Goal: To target tissues lying within the SBL, SPL, FL, DFL and hip flexion: medial hamstrings.

Client position: Supine with left leg in hip flexion and abduction.

Therapist:

- Moving from the previous position walk back up to side of table.
- Place their leg across your hips.
- Hook their heel on the outside of your hip hugging it against you with your outside hand.
- Place your other hand behind their knee for support.

ROM: Hip flexion and abduction (move their leg towards the top of the table).

Traction: Out of the hip socket away from their pelvis.

Traction by leaning your body away from the table – use your hips!

Increase the traction by lunging out to the side.

PNF: Client contracts hamstrings and adductors.

PNF cue: "Press your leg back into me."

Stretch: Hip flexion and abduction.

Repeat: PNF two or more times.

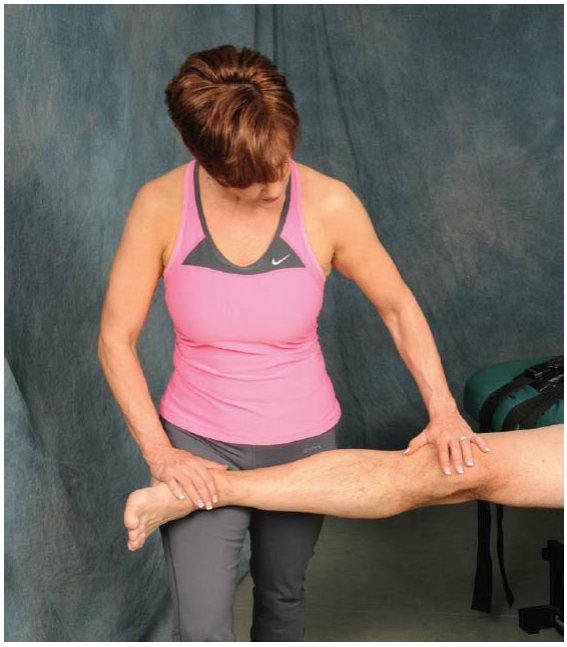

Figure 5.14a Adductors focus

Figure 5.14b Position

Figure 5.14c Adductors

4. Hip flexion, abduction, knee extension – long adductors focus – SBL, FL, SPL, DFL

Goal: To target tissues lying within the SBL, FL, SPL, DFL: long adductors.
Client position: Supine with leg in hip flexion and abduction.
Therapist: From last position; keep leg across your hips.
Change the hand position from last stretch. Move your hand to top of their leg on medial side of their ankle and knee.
Use your hips to traction by lunging out to side.
Slide their leg down your leg with your hands.
Take care of your back – don't bend over too much!
ROM: Hip flexion and transverse, horizontal abduction.
Traction: Out of the hip socket to the side and down towards the floor.
PNF: Client contracts their adductors.
PNF cue: "Press your entire leg up to the ceiling."
Stretch: Increase abduction by sliding their leg down your leg toward floor.
Repeat: PNF two or more times.
Play with alternating between the angles and different fibers of the tissues here.

Figure 5.15a Therapist position finds interface between medial hamstrings and adductors

5. Hip flexion, abduction, knee extension – hamstrings and long adductors combination – SBL, FL, SPL, DFL

Goal: To target tissues lying within the SBL, FL, SPL, DFL: hamstrings and long adductors.

Client position: Supine with leg in hip flexion and abduction.

Therapist:

- From the previous position, release the stretch and reduce ROM.
- The therapist now brings a combination of movement of hip flexion and abduction.
- Reposition the client's leg up across your hips again.
- Create traction by using your hips to lean away from the table.
- Move your hands back to more a medial aspect of their femur again, but still have some contact with the adductors.
- Hold their heel across your hip for support.

Figure 5.15b PNF combination of medial hamstring and adductors

ROM: Hip flexion and abduction.
Traction: Out of the hip socket to the side, down towards the floor and then up into flexion. Use your entire body to traction by leaning away from the table.
PNF: Client contracts both their hamstring and adductor at the same time.
PNF cue: "Press your leg back into me and upward towards ceiling."
Stretch:

- Increase hip flexion and abduction.
- Increase stretch by moving femur away from the pelvis, down towards the floor and then up towards the top of the table.
- Play with alternating between the angles and different fibers of the tissues.

Repeat: PNF two or more times.

Use traction to transition to lateral aspect of the hamstrings on the other side of the table.

6. Hip flexion, adduction, internal rotation with lumbar rotation – low back, glutes, IT band, fibularis – SBL, LL

Goal: Target tissues lying within the SBL, LL: low back, glutes, IT band, fibularis.
Client position: Partial sidelying with the working leg adducted across their stationary leg.
Therapist:

- Sit on the table if you need to for position.

- Drop your weight down and lean away to find ROM and increase traction.
- Drop the client's leg towards the floor with your hands placed on the outside of the knee and above their ankle.

ROM: Adduction, internal rotation and hip flexion with lumbar rotation.

Traction: Traction leg out (of hip socket), away from the table and down towards the floor.

PNF: Client contracts the lateral aspect of the hip and leg up into abduction.

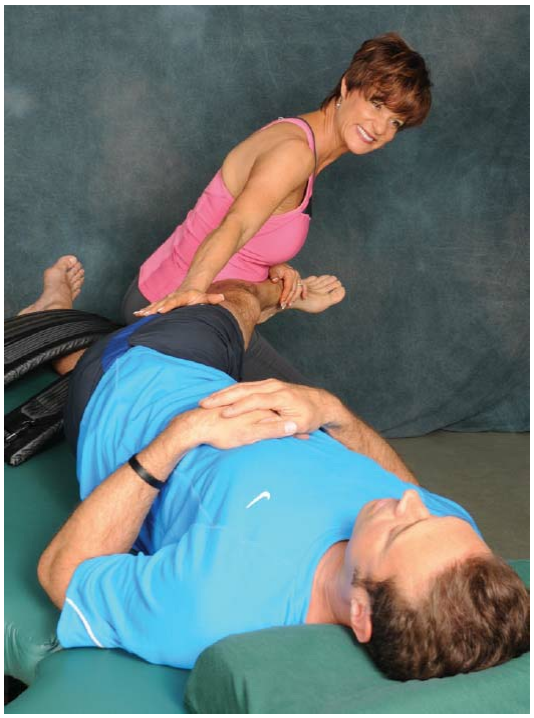

Figure 5.16a Lateral traction out to corner and down towards floor

Figure 5.16b Lateral Line and Lateral hamstring down to floor

PNF cue: "Press your entire leg up towards the ceiling."
Stretch: Increase adduction, internal rotation and hip flexion with lumbar rotation.
Repeat: PNF two or more times.
If you were sitting on the table, stand up and traction leg across client's body before moving into the next stretch.

7. Hip flexion, adduction, knee extension, lumbar rotation – low back, lateral hamstrings, glutes, IT band, fibularis – LL, SPL, SBL

Goal: To target tissues lying within the SPL, SBL: low back, glutes, IT band, fibularis.
Client position: Supine to partial sidelying with their leg adducted across their body.
Therapist:

- From the previous position step out to the side away from the table.
- Place the client's leg across your hip and hook their heel on the outside for support and traction.
- Place one hand on their heel and the other above their knee or on their hip for support.

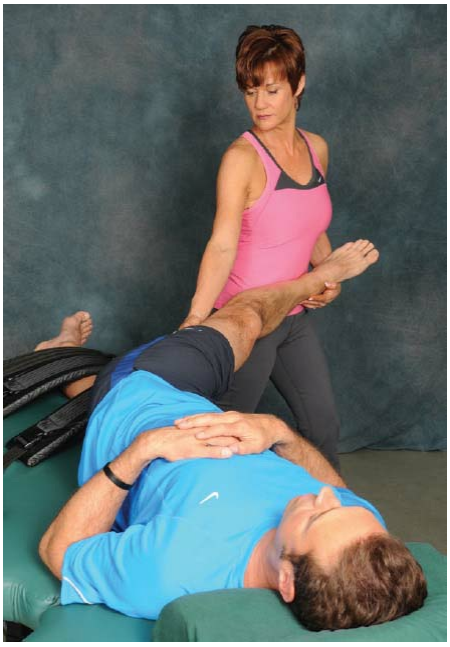

Figure 5.17a Lateral traction

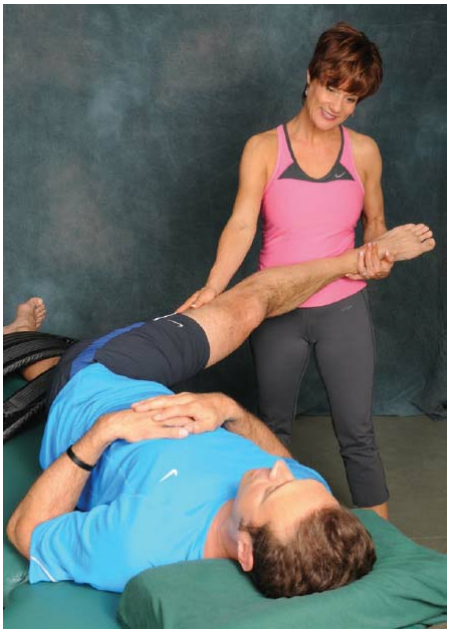

Figure 5.17b Low position 1 focus on lateral hamstrings, SPL, SBL.

ROM: Hip flexion with lumbar rotation and adduction.
Traction: Out of the hip socket and up towards the top of the table.
Use your body to move their leg into increased ROM and stretch.
PNF: Client contracts their hamstring.

PNF cue: "Press your leg back into my body."
Stretch: Increase hip flexion with lumbar rotation and adduction.
Repeat: PNF two or more times.
Increase the stretch by increasing hip flexion towards the top of the table on a diagonal and up to their head.

8. Hip flexion, adduction, internal rotation with lumbar rotation – low back, glutes, IT band, fibularis – lateral hamstrings, high position – SPL, SBL

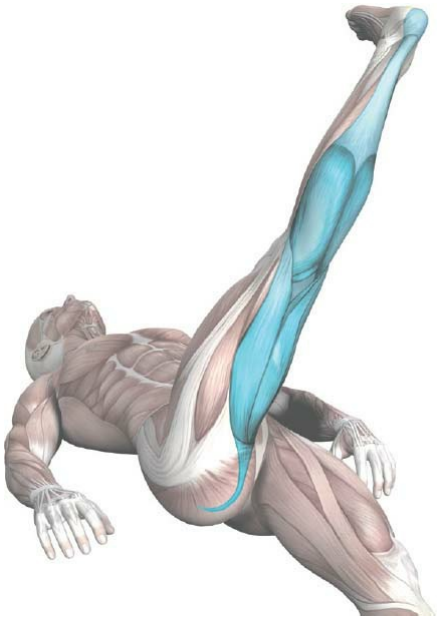

Figure 5.17c Target tissues within Superficial Back Line

Figure 5.17d High position 1 focus on lateral hamstring, SPL, SBL

Figure 5.17e High position 2 continue arc across body

Goal: To target tissues lying within the SPL, SBL and lateral hamstrings in a new angle.
Client position: Supine
Therapist: From the previous position, lift the client's leg higher towards to the ceiling. Place your hands on the heel and on the back of their hamstring.

Traction: Out of the hip socket and up to the diagonal, top corner of table toward opposite shoulder.
ROM: Hip flexion with lumbar rotation and adduction.
Traction: Out and up.
PNF: Client contracts their hamstring.
PNF cues: "Press your leg back to me."
Stretch: Increase hip flexion with lumbar rotation and adduction. Leg is up and across on the diagonal.
Repeat: PNF two or more times.

D. Range of Motion Evaluation, Warm-up and FST-PNF Stretch

1. Pelvic external rotation – iliacus and psoas – DFL

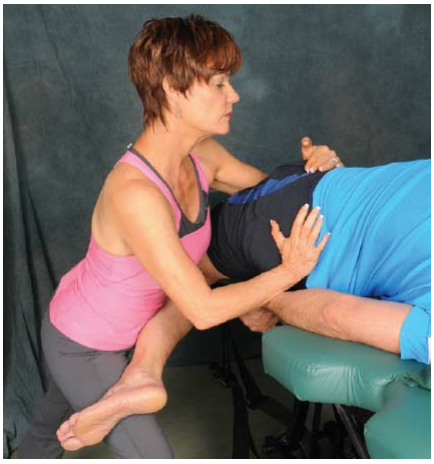

Figure 5.18 Pelvic rocking into external rotation

Goal: To target tissues lying within the DFL: proximal iliacus and distal psoas Increase external rotation of the pelvic bone.
Client position: Lying on their side with top leg in extended hip neutral and bottom leg up into partial hip and knee flexion. Make sure their hips remain stacked on top on each other and their arms are resting comfortably.
Therapist:
- Stand and face the client. Support their lower leg on your outside hip.
- Bend forward toward the client to get into position.
- Place one hand on the front of their ASIS and the other hand on the back of the PSIS.
- Cup their pelvis between your hands.

- Move in a gentle rocking motion back and forth. It is a small movement.

ROM: External rotation of the pelvic bone to aid hip extension.
Traction: Lift the front of their pelvis up towards the ceiling.
PNF: Client contracts their iliacus and psoas into your front hand.
PNF cue: "Roll your abdominals and hip down to the table."
Stretch:
- Increase external rotation of the pelvic bone, target iliacus.
- Re-check passive ROM.

Repeat: PNF two or more times.

> **NOTE**
> The client's knee should not be bent past 90° for the following stretches 2, 3 and 4 or it will become a quad stretch too soon.

2. Hip extension – hip flexors – SFL, DFL, FL, SPL, LL

Goal: To target tissues lying within the SFL, DFL, FL, SPL, FL: proximal attachments of hip flexors. To increase hip extension.
Client position: Lying on their side with top leg in hip extension, slight knee flexion and bottom leg up into hip flexion and bent at the knee. Make sure their shoulders and hips remain stacked on top on each other and their arms are resting comfortably.
Therapist:
- From the previous position, while still facing client, stand up.
- Step away from the table with your outside foot.
- Hook the client's foot on your outside hip, hold their heel in your hand.
- Place your other hand on their femur above their knee for support.
- Hug their foot into your ribcage and lean away to traction.
- Move back and forth into and out of extension.
- Dance with them to mobilize various angles before stretching.

ROM: Hip extension.
Traction: Move the client's femur into extension. Use your whole body to move their leg.

Figure 5.19a Hip extension for hip flexor proximal attachments attachments

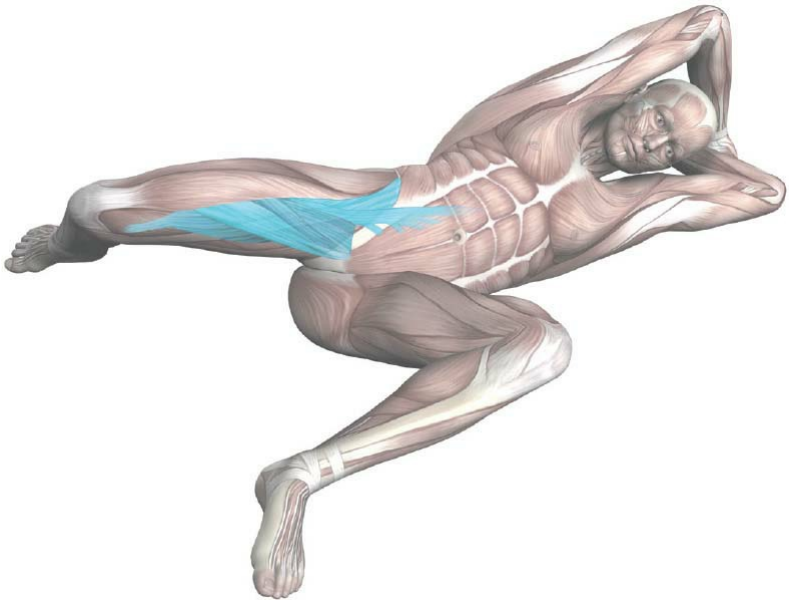

Figure 5.19b Target tissues primarily in the Deep Front Line

PNF: Client rolls their body down to the table and contracts their hip flexors.
PNF cue: From origin "Roll your abs and hip down to the table."
From Insertion: "Pull your knee towards your other leg."

Origin and Insertion PNF Combo "Roll and pull."
Stretch: Increase hip extension.
Repeat: PNF two or more times.

3. Hip extension, adduction – hip flexors and abductors – SFL, DFL, FL, SPL, LL

Goal: To target tissues lying within the SFL, DFL, FL, SPL, FL: lateral fibers of hip flexors and abductors.
Increased hip extension and hip adduction.
Client position: Lying on their side with top leg in hip extension, slight knee flexion and bottom leg up into hip flexion and bent at the knee. Make sure their hips and shoulders remain stacked on top on each other and that their arms are resting comfortably.
Therapist:
- From the last position, move closer in to the table again.
- Drop the client's foot down across your thigh or into whatever position is comfortable for both of you.

Therapist's hand position:
- Wrap your inside arm around the front of their quad and grasp it under the table, if possible.

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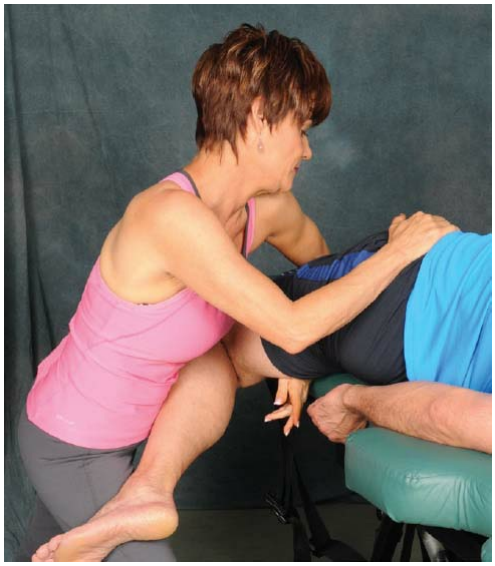

Figure 5.20a Hip extension for anterior and lateral fibers of hip flexors

Figure 5.20b Hip extension focus on lateral fibers

NOTE

Remember: the placement may be a little different for each client. If the position is not correct their ankle may feel caught. Use your lats and drop your body weight down for additional leverage.

- Bend your body and use your inside arm for resistance and to increase the stretch. Bend your knees and use your legs too!
- Use your body weight to increase the stretch by dropping your weight onto client's leg.
- Be aware of keeping their femur and lower leg in proper alignment for the safety of the knee, especially the medial aspect.
- The client's knee should not be bent past 90° or it will become a quad stretch too soon which comes later.

ROM: Hip extension and adduction.

Traction: Femur out of hip socket. Think of tractioning all of the tissue as you move it into extension and adduction.

PNF: Client contracts lateral aspect of upper leg and hip.

PNF cue: "Lift your leg up into me." (towards the ceiling)

Stretch: Increase hip extension and adduction.

Repeat: PNF two or more times.

4. Hip extension – hip flexors – fascial component – SFL, DFL, FL, SPL

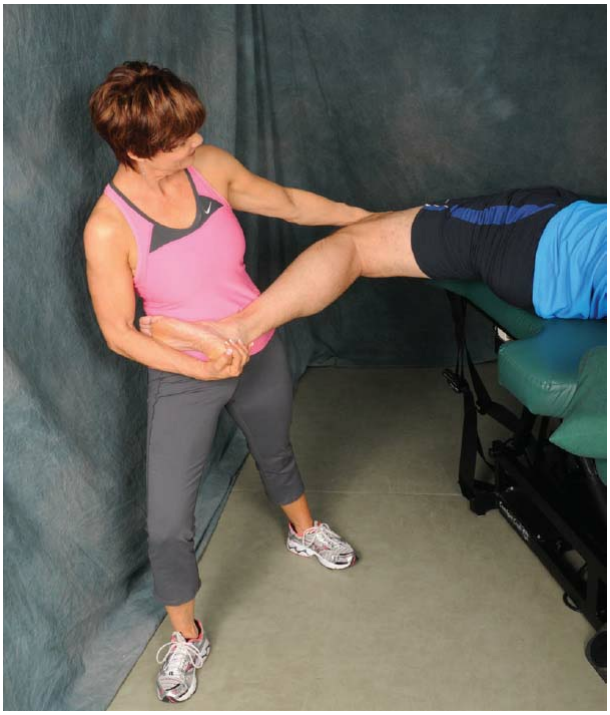

Figure 5.21a Increased hip extension

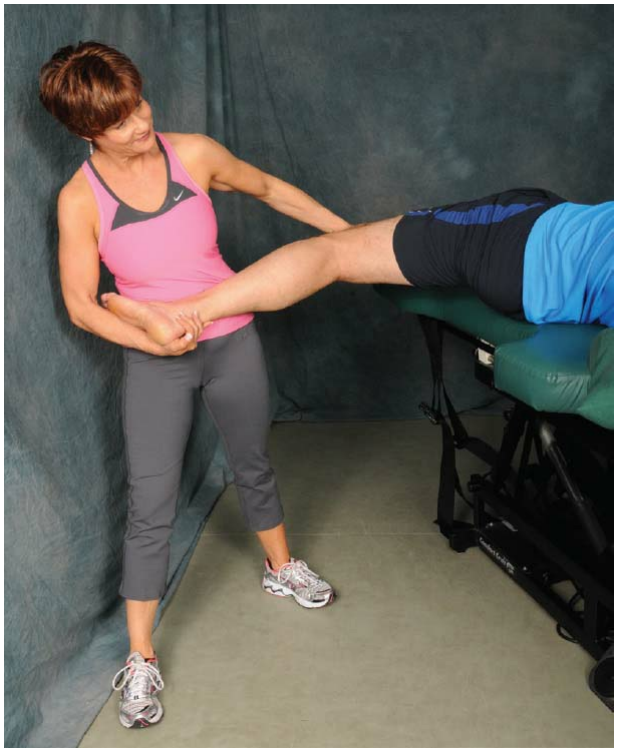

Figure 5.21b Increased hip extension with more traction

Goal: To target tissues lying within the SFL, DFL, FL, SPL: entire hip flexors complex with all the fascial components.
To increase hip extension to its fullest potential using more traction!
Client position: Lying on their side with top leg in hip extension, slight knee flexion and bottom leg up into hip flexion and bent at the knee. Arms resting comfortably.
Therapist:

- From the previous position, stand up and lunge away from the table with your outside foot.
- Hook their foot on your outside hip, hold their heel in your hand.
- Place your other hand on their femur above their knee for support.
- Squeeze their foot into your ribcage and lean away to traction.
- Lean away with your body increase the stretch.

ROM: Hip extension.
Traction: Out – moving the femur into extension. Increase the traction by leaning away with your body more.
PNF: Client contracts entire hip flexor complex.
PNF cue: "Pull your entire leg across your body."
Stretch: Increase hip extension. Play with the angles.

Repeat: PNF two or more times.

5. Hip extension, knee flexion – quadriceps focus – SFL, DFL, FL, SPL, FL

> **NOTE**
> It is very important to move slowly and gently into knee flexion.

Goal: To target SFL, DFL, FL, SPL, FL hip flexors and quads. To increase hip extension and knee flexion.
Client position: Lying on their side with top leg in hip extension, knee flexion about 90° and bottom leg up into hip flexion and bent at the knee. Arms resting comfortably.
Therapist:

- From last position, reduce the hip extension a bit and slowly increase the knee flexion.
- Square your hips off to face the table and move your body closer to the table.
- Increase the stretch.
- You can move back and forth from the hip extension to the knee flexion.
- You can intensify the stretch by combining the hip and knee flexion, but be gentle as this is a very deep stretch.

ROM: Hip extension and knee flexion.
Traction: Femur out of the hip socket.
PNF: Client contracts their quadriceps by extending knee.
PNF cue: "Kick me!" We find this is a better cue than "Extend your knee!"
Stretch: Hip extension and knee flexion.
Slowly bend their knee toward glutes (increase knee flexion).
Repeat: PNF two or more times. Play with the angles.
Repeat hip flexor and quad series on the other side or repeat B through E on other leg, depending on whole or partial sequence.

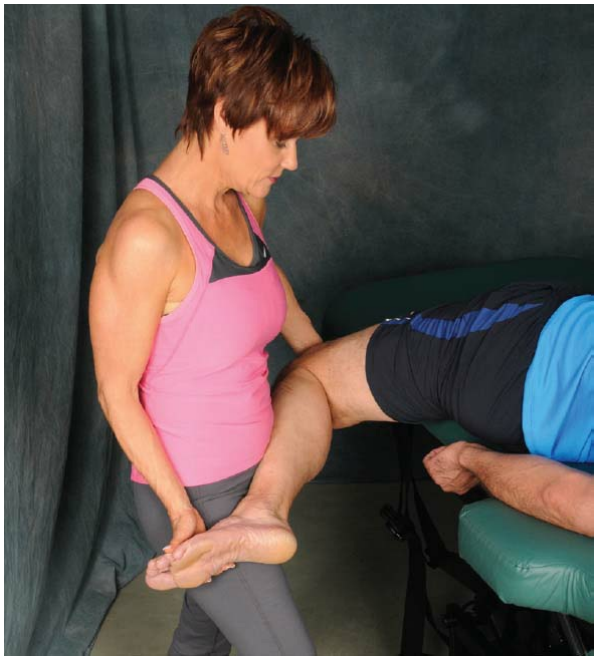

Figure 5.22a Hip extension with knee flexion

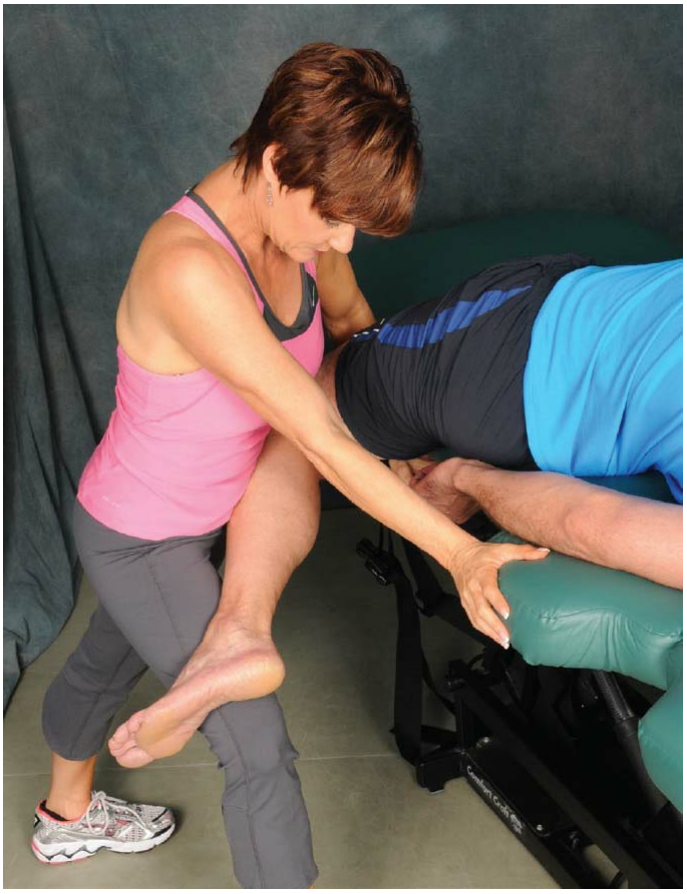

Figure 5.22b Grab the table for better leverage

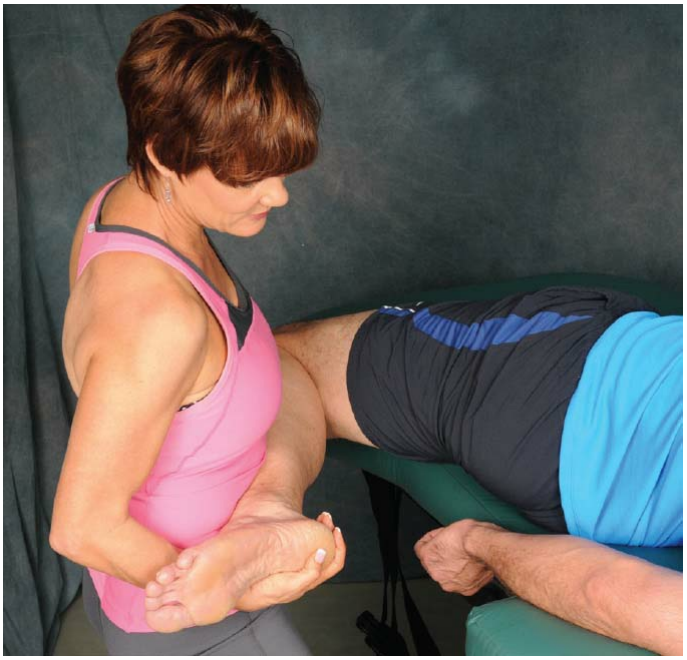

Figure 5.22c Increased hip extension, knee flexion

E. Lateral Line

1. Low back side bend from below – fascia from fibularis (peroneals) to QL – LL, SPL

Goal: To target the tissues lying within the LL, SPL: lateral hip and torso, fascia from fibularis (peroneals) to QL .
Increase lateral flexion.
Client position: Supine with arms at their side.
Therapist:
- Lifts both of client's legs for passive extension with traction at 10°–20°.
- 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.

ROM: Move slowly to your the left side until the client's movement stops at R1.

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Figure 5.23a Lateral line for the left side

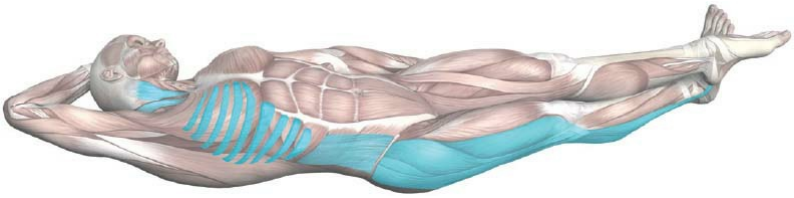

Figure 5.23b Target tissues within the Lateral Line here shown on the right side of the body

Traction: Lean back with your body, staying relaxed.

Figure 5.23c Lateral line (lateral line legs crossed)

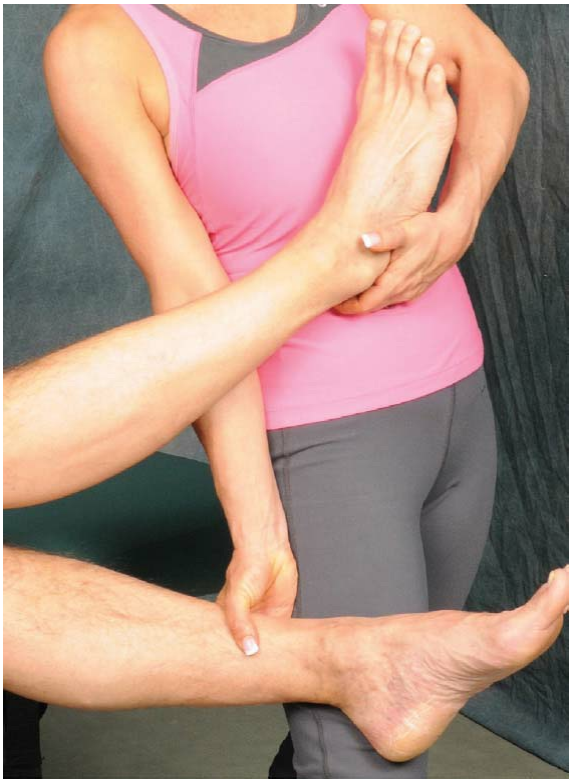

Figure 5.23d Lateral line – sliding leg down

Therapist:

- From the previous position, place the client's left leg (the bottom one) on your hip or quad as you move to your left.

- Lift their right leg higher, holding at their heel.
- Place your other hand on the outside of the left leg for PNF cue.
- Lean your torso back as you press your hips or thigh forward to increase the stretch.

ROM: Increase ROM by increasing lateral flexion.

Traction: Lean away.

PNF: Client contracts the lateral aspect of the left leg.

PNF cue: "Press your leg back into me."

Stretch: Increase their lateral flexion.

Therapist:

- From the last position, use your hand to slide their left leg down your body to increase the stretch.
- Continue to lunge as you slide their leg down your quad and lean back slightly to increase the stretch.

Traction: Keep tractioning out as you move. Think of the traction as if you are moving together in an arc away from the table and then up towards the top of the table.

Use your body and not your arms to feel the tissue as you lean away from the table.

PNF: Client contracts the lateral aspect of the left leg.

PNF cue: "Press your leg back into me."

Stretch: Increase their lateral flexion (slide their leg down towards floor).

Repeat: PNF two or more times.

Figure 5.23e Lateral Line close up

F. Repeat Entire Series on the Right Leg B through D

Now repeat lateral line to the right side to finish.

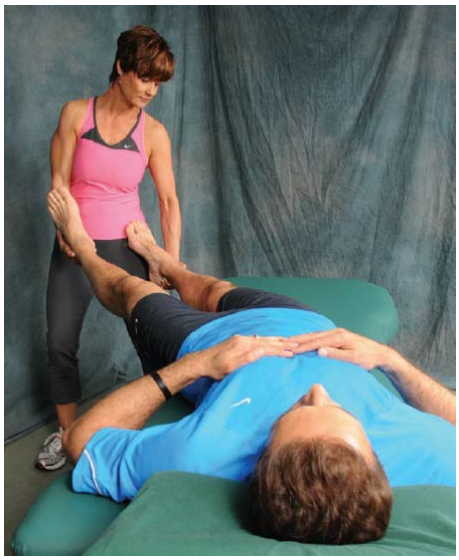

Figure 5.24a Lateral line moving to right.

Figure 5.24b Lateral line crossed legs to right side.

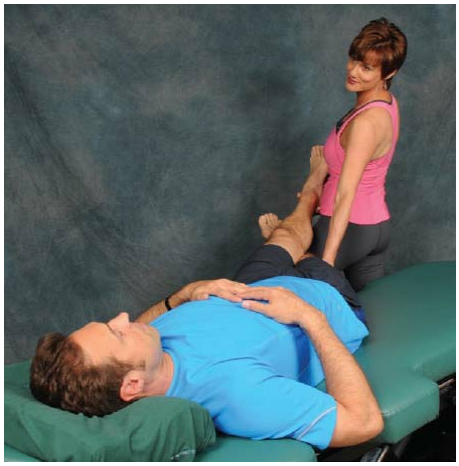

Figure 5.24c Lateral line sliding leg down to right side.

G. Pelvic Stabilization and Sacral Set

Essential movement to finish all table sequences (long or short)

1. Abductor contractions

Goal: To give client pelvic stability and proprioceptive grounding after the lower body work on the table.

Client position: Supine, with their knees together and bent, both feet flat on the table about a foot away from hips.

Therapist: Can be up on top of table straddling client or on the floor.

Hands can be placed outside the knees if there is any question of knee injury or instability.

PNF: They abduct their legs against your total 100% resistance three times.

PNF cue: "Open your knees."

Figure 5.25 Pelvic stabilization

2. Adductor contractions

Therapist: Right arm in between the client's legs.
Client position: They give a 100% contraction.
PNF: "Squeeze your knees into me."

Figure 5.26a Right arm in

Therapist: Left arm in between the client's legs.
Client position: They give a 100% contraction.
PNF: "Squeeze again."

Figure 5.26b Left arm in

Figure 5.26c Both arms in

Therapist: Both arms between their legs.
Client position: They give a 100% contraction.
PNF: "Squeeze your knees into me one more time."

3. Sacral set

Goal: To ensure sacrum/SI joints are positioned and stabilized back to neutral position.
Client position: Same position.
Therapist:

- Press knees straight downward into table through the femurs at an angle of 45° to reset the sacrum to a neutral position.
- Hands should be straight underneath your body with fingertips facing out. They are placed on their femurs not on their kneecaps.
- Lock your elbows and drive all of your weight straight down through their femurs.
- Tuck your elbows into your torso for extra support.
- Ask if the pressure feels evenly distributed.
- Stay there for a minute and then gently pulse downward.
- Tell your client to, "Relax and breathe."

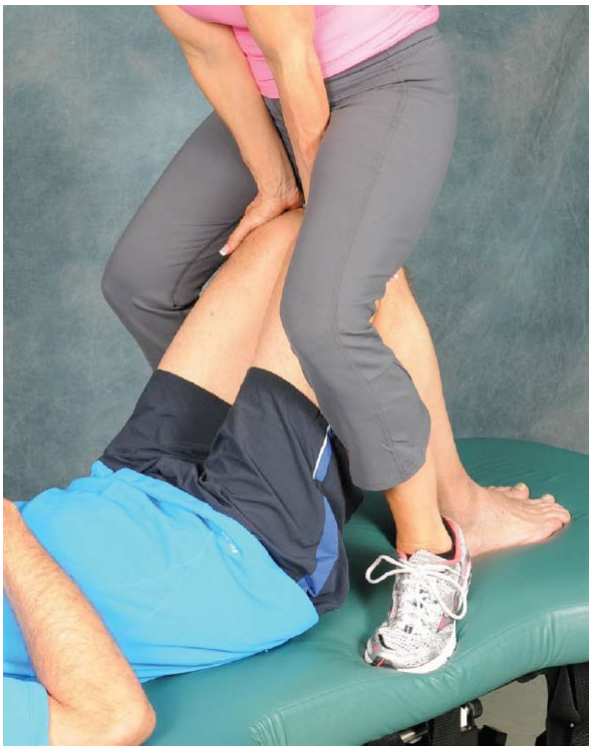

Figure 5.27a Sacral set

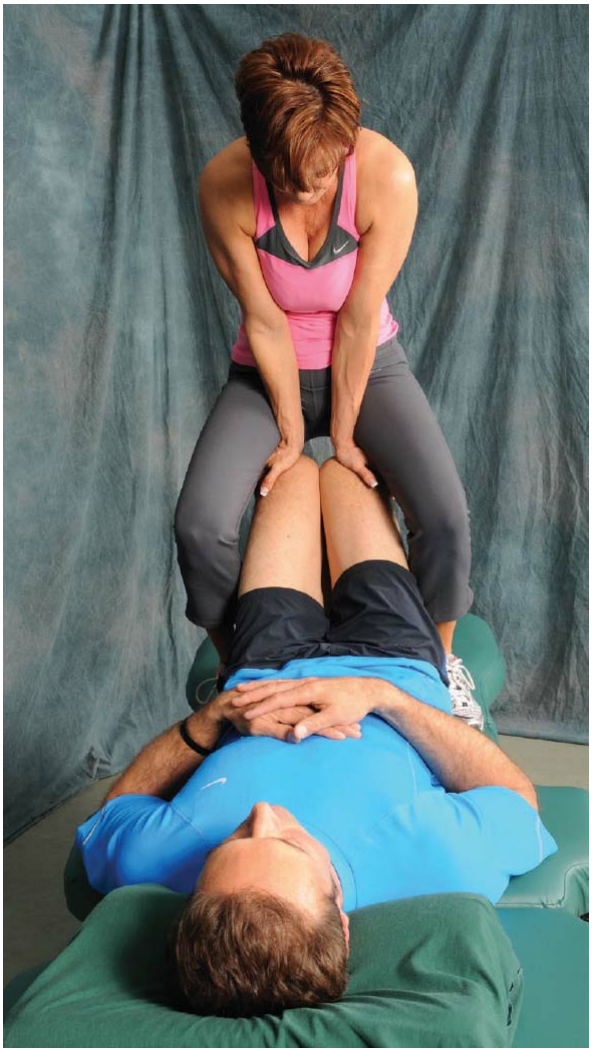

Figure 5.27b Sacral set front view

H. Standing Lunge: Back/Hip/Knee Extension, Ankle Dorsiflexion – Gastrocsoleus – SBL

This should not be painful.

Goal: Target tissues lying within the SBL: soleus and gastrocnemius.

Client position: Stands up and leans against the wall in a lunge position.

The client bends both knees and keeps the back heel down on the floor (Figure 5.28b).

Once the therapist is in position the client slowly shifts from side to side and then rotates their hips back and forth.

Therapist:

- Sit behind the client on the floor and cross your legs around the ankle of their back leg. Use your adductors to stabilize the leg. An alternate position is shown in Figure 5.28d with legs opened.

- Grasp the front of their ankle by interlacing your fingers above the ankle bones (Figure 5.28c).
- Think of pulling their tibia behind their femur.
- Slowly move your hands up the front of the client's shin as they continue to press their hips forward (Figure 5.28d).

ROM: Lean your body back.

Traction: Lean back with your entire body as they press their hips forward into the wall.

PNF: "Pull your hips to the wall."

"With your hips still pulling to wall bend your back knee."

"Shift your hips from side to side."

"Rotate your hips around your femur."

Stretch: Move from side to side to increase the stretch while maintaining the traction pulling back on the lower leg.

Repeat: Similar series with a straight knee for gastrocs.

Repeat: The entire series on the other leg.

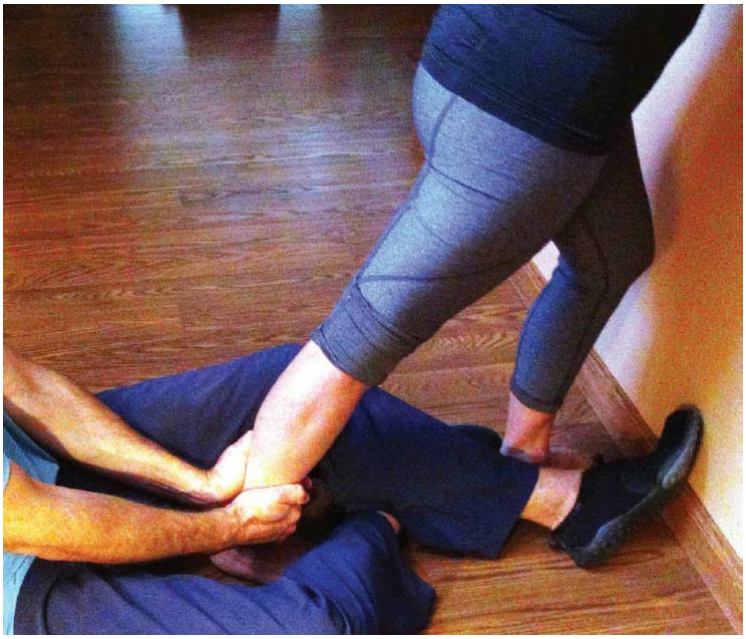

Figure 5.28a Client lunges against wall

Figure 5.28b Hand position low

Figure 5.28c Client bends knee for soleus

Figure 5.28d Hand position higher for soleus

Repeat: The entire series on the other leg.

Figure 5.29a Hand position for low for gastroc

Figure 5.29b Higher

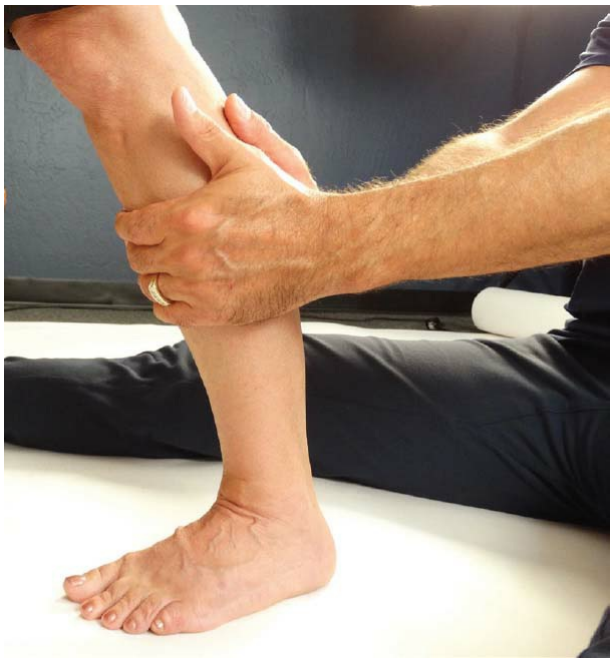

Figure 5.29c Highest

Repeat: The entire series on the other leg.

6

Upper Body Technique

A. General Evaluation

Supine observations

Before beginning the evaluation test the client's arm length. Have them actively extend both their arms out at 90° flexion and place their palms together. Then have them continue to flex over their head with palms together, ending as close to 180° as possible without pain. Arms return back to neutral.

1. Make sure the person lying on the table is lined up evenly.
2. Check for overall symmetry. Squat down to get a better look.
3. Check the level and symmetry of their shoulders.
4. Head, ribcage and pelvis relationship.
5. Check for bony landmarks.
6. Check to see if there is a rounding forward of the shoulders.
7. Shoulder anterior to posterior spring – what is the feel of the tissue?
8. Check for arm length and fingertip length.

The duration of the evaluation changes based on time availability, for example a 15 second evaluation for a 15 minute FST session.

B. Side Lying

Shoulder warm-up and assessment

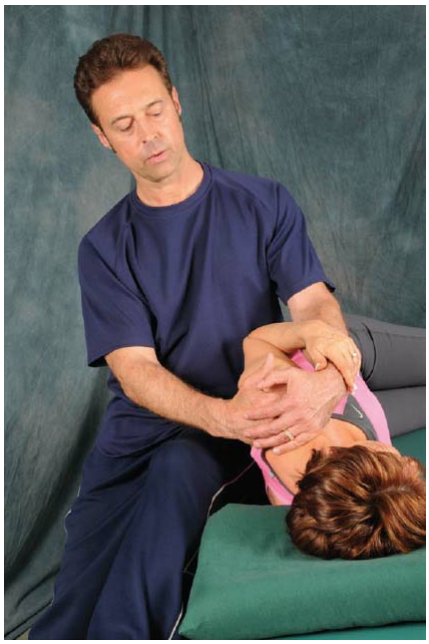

Figure 6.1a Therapist body position

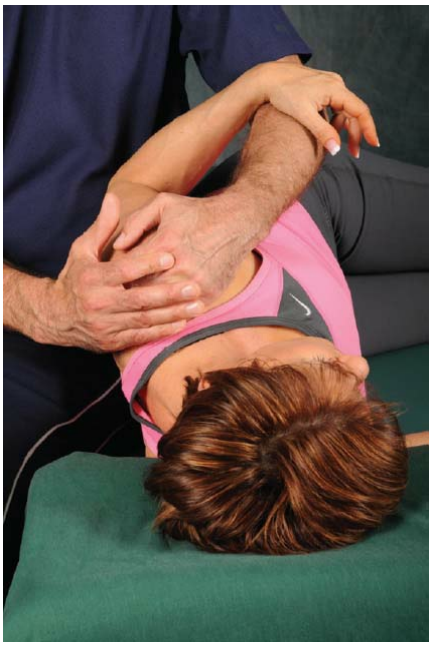

Figure 6.1b Therapist hand position

Goal: Scapula ROM warm up and assessment movement in shoulder girdle.
Client position: Lies on their side with shoulders and knees stacked (pillow in between if needed). Make sure their head is in a neutral position.
Therapist:
- Therapist sits on the side of the table behind client.
- Cup your hands over the top of your client's shoulder, with one hand placed over the other.
- Rest their wrist comfortably on your arm.

Therapist:
- Lean forward with your body to begin gently moving the client's shoulder around to check ROM.
- As you circumduct the client's shoulder, allow it to move forward and then downward on the exhalation.

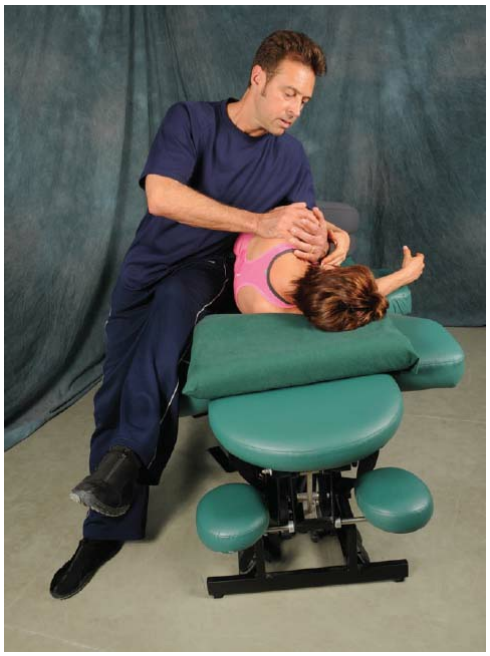

Figure 6.1c Circumduction

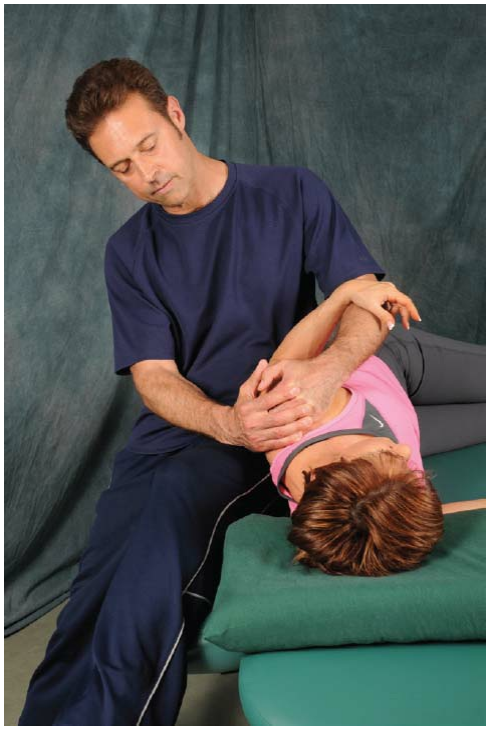

Figure 6.2a Retraction

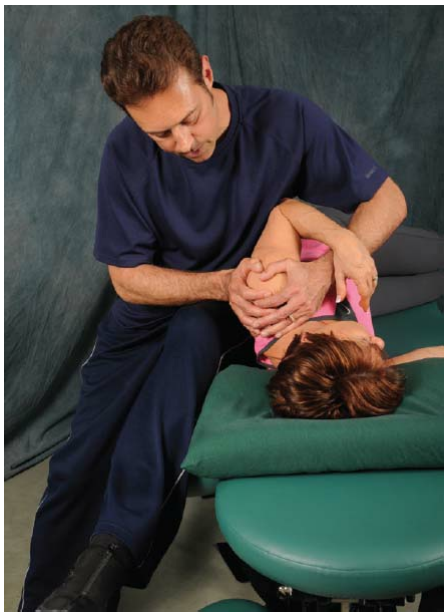

Figure 6.2b Protraction

Goal: Target SFAL, DFAL.
Increase retraction.
Client position: Client lies on their side with shoulders and knees stacked.

Make sure their head is in a neutral position.

Therapist:

- With your hand and body in the same position, circle to open their shoulder back into retraction.
- Lean your body weight back into the stretch.

ROM: Open shoulder back into retraction.

Traction: Open shoulder back into retraction.

PNF: Client contracts and pulls their shoulder forward into your hands into protraction.

Cue for PNF: "Pull your shoulder forward into my hands."

Stretch: Increase shoulder retraction.

Repeat: Two or more times.

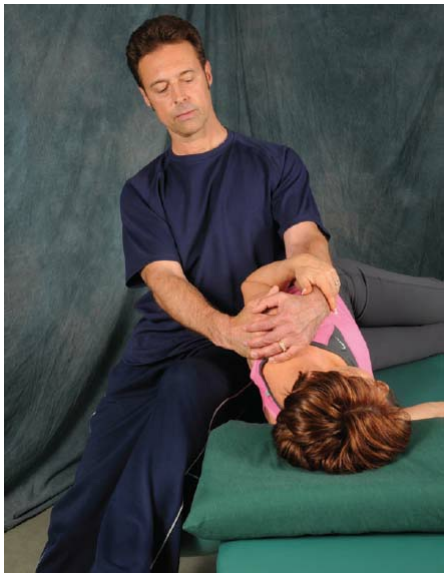

Figure 6.2c Depression

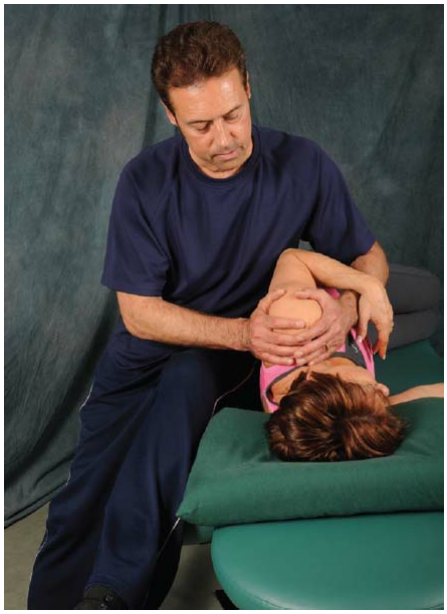

Figure 6.2d Elevation

Goal: Target SFAL and DFAL.
Increase shoulder depression.
Client position: Lies on their side with shoulders and knees stacked.
Therapist: Traction client's shoulder downward for the stretch.
ROM: Shoulder depression.
Traction: Depress shoulder downward toward top hip.
PNF: Client contracts to elevate shoulder upward in elevation.
Cue for PNF: "Shrug up into my hands."
Stretch: Increase shoulder depression.
Repeat: Two or more times.
Circumduct again. Are there any improvements?

C. Range of Motion Evaluation Warm-up and FST-PNF Stretch

Traction, oscillate and circumduct (TOC) the shoulder and arm anytime within this sequence to ensure the client remains relaxed and the nervous system remains in parasympathetic mode.

All PNF stretches should be done using traction throughout the stretching process.

1. Traction arm up

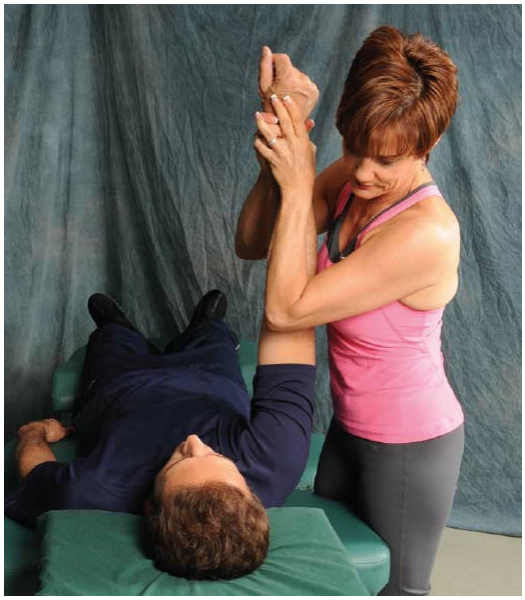

Figure 6.3 Traction arm up (TOC)

Goal: Target tissues within the DBAL: posterior aspect of the shoulder joint. Check for anterior to posterior joint glide and restrictions.
Client position: Client lying supine on the table.
Therapist:
- Grasp client arm on the lower arm bones to traction their arm upward, keeping the clients elbow straight. Hands are placed on each side of their wrist above the joint.
- Traction of the shoulder up at 90° flexion.
- Stand very close to client and lean slightly over them to have the best leverage.
- Check for posterior joint glide and restrictions by gently lifting the arm upward.

Traction: Shoulder up at 90° flexion.

2. Oscillation–circumduction

Goal: To relax the nervous system and give the therapist an opportunity to begin general assessment of the client's shoulder movement and nervous system.
Client position: Lying supine.
Therapist:
- From the previous position gently place your hand around the medial aspect of the client's elbow. Your other hand remains on the medial side of their wrists.
- Spend a few moments alternating between traction, oscillation and circumduction

of the shoulder joint in clockwise and counter-clockwise directions.

Traction: Shoulder up at 90° flexion.

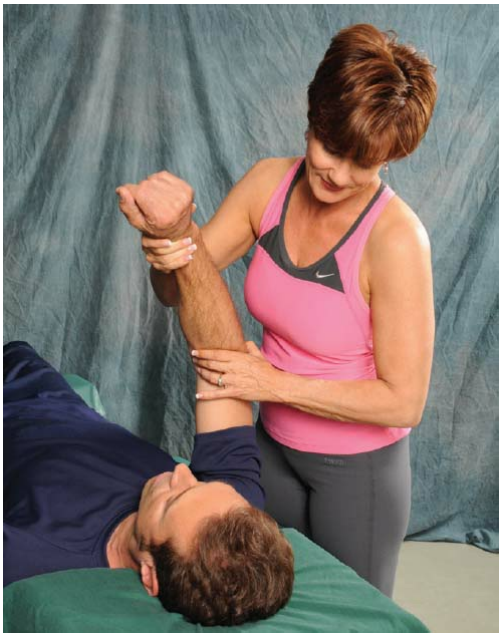

Figure 6.4 Oscillate-circumduct (TOC)

3. Shoulder traction (neutral/loose glenohumeral joint position) – traps, scalenes, joint capsule – SBAL, DBAL

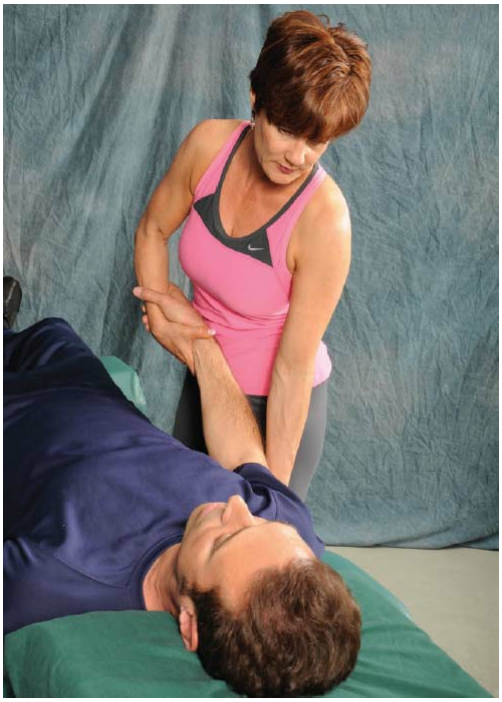

Figure 6.5a Traction arm down toward foot of table

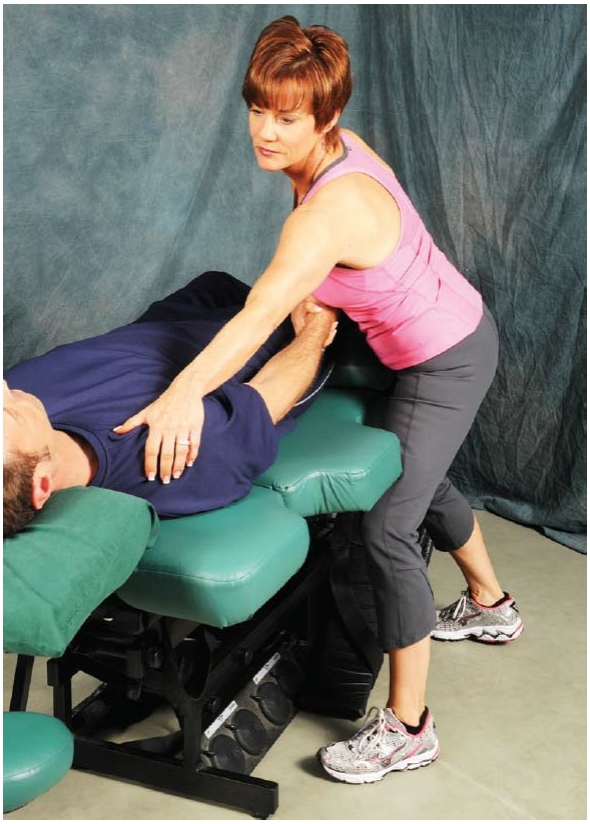

Figure 6.5b Trap stretch with PNF

A. Goal: Target tissues within the SBAL, DBAL: upper traps, scalenes, glenohumeral joint capsule.
Client position: Lying supine, reaches out and grasps the therapist's wrist.
Therapist: Place one hand above the client's elbow joint. Therapist and client hand position: grasp just above each other's wrists. Step back into a lunge and lean back on the exhalation to traction.
Traction: Depression of shoulder.
B. Goal: Target tissues within the SBAL, DBAL: upper traps, scalenes, glenohumeral joint capsule.
Client position: Lying supine, continues to grasp the therapist's wrist.
Therapist:

- From the previous position, reach up with your outside arm and places your hand on the client's shoulder.
- Remain holding above the client's wrist, while they continue to hold onto yours, for a solid contact.
- Both inhale in the PNF contraction.
- Step back into a lunge and lean your body back on the exhale to traction.

ROM: Depression

Traction: Shoulder down into deeper depression.
PNF: Client contracts shoulder up in a shrug motion, up towards their ear and into the therapist's hand
Cue for PNF: "Shrug up into my hand."
Stretch: Increase shoulder depression.
Repeat: PNF two or more times.

4. Shoulder traction (slight flexion/abduction position) – traps, rhomboids, joint capsule – SBAL, DBAL

Figure 6.6 Traction arm out to side low

Goal: To target tissues within the SBAL: upper traps, rhomboid minor, glenohumeral joint capsule.
Client position: Supine with their arm across your torso.
Therapist:
- Move the client's arm up to the side, with their hand facing your body and across your torso.
- Hook their hand on your hip for a solid point of contact.
- Place one of your hands above their elbow and the other above their wrist.

ROM: Shoulder depression and arm abduction.
Traction: Arm out to side low-corner pocket of the table.
PNF: Client contracts and shrugs their shoulder and scapula up towards their ear.
Cue for PNF: "Shrug you shoulder towards your ear."
Stretch: Increase shoulder depression and arm abduction.
Repeat: PNF two or more times.

5. Shoulder traction (in 90° abduction) – trap, rhomboids, joint capsule – SFAL, SBAL, DBAL, DFAL, FL

Figure 6.7 Traction arm out to side at a 90° angle

Goal: Target tissues within the SFAL, SBAL, DBAL, DFAL, FL: trap, rhomboids, joint capsule.
To increase shoulder depression and abduction.
Client position: Supine with arm in horizontal flexion.
Therapist:

- From the previous position, continue to move the client's arm up to the side, with their hand facing your body and across your torso.
- Hand position remains the same – one of your hands above their elbow and the other above their wrist.
- Use your body to lean away for the ROM and traction.

ROM: Horizontal flexion.
Traction: Slowly increase traction of arm away from their torso.
PNF: Client shrugs their shoulder and scapula up towards their ear.
PNF cue: "Shrug you shoulder towards your ear."
Stretch: Increase shoulder depression and abduction.
Repeat: PNF two or more times.

6. Shoulder traction in transverse, horizontal abduction (at 90°) – pec major/minor, biceps brachii, coracobrachialis – SFAL, DFAL, FL

Figure 6.8 Anterior chest – drop arm to floor

Goal: Target tissues within the SFAL, DFAL, FL: anterior chest from the low fibers to high fibers pec major/minor, biceps brachii, coracobrachialis, rotator cuff, joint capsule.

Client position: Supine with their arm out to the side in abduction.

Arm position: Abduction from 45°–160°.

Therapist: One hand on client's deltoid-pectoral area. The other hand is above their wrist.

- From the previous position, turn the client's palm to the ceiling.
- Place one hand on their shoulder and the other above their wrist.
- Lower your body to increase the stretch. (Remember to allow your whole body to feel the tissue, not just your hands.)

ROM: Shoulder abduction.

Traction: Arm out and down toward floor on exhale.

PNF: Have client press their entire arm toward the ceiling.

Cue for PNF: "Press your entire arm up to the ceiling."

Stretch: Increase shoulder transverse/horizontal abduction.

Repeat: PNF two or more times.

7. Shoulder traction (diagonal overhead position) – pec major/minor, coracobrachialis, rhomboids, lats – FL, SFAL, DFAL, DBAL, SBAL

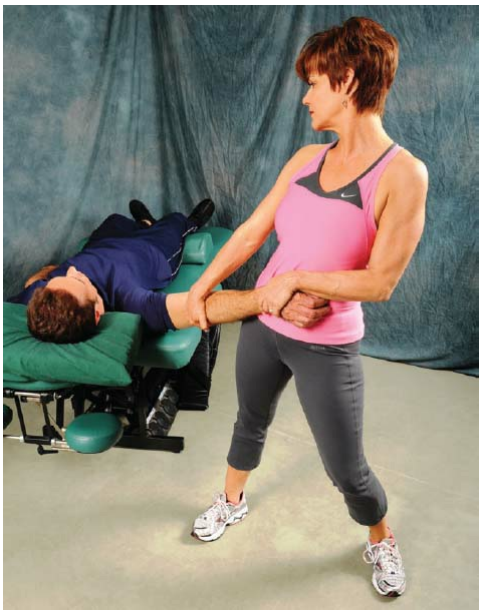

Figure 6.9 Arm up to diagonal

Goal: To target tissues within the FL, SFAL, DFAL, DBAL, SBAL: including pec major/minor, coracobrachialis, rhomboids, lats, rotator cuff. To increase shoulder abduction, flexion.

Client position: Supine with their arm out to the side in abduction and across your torso.

Therapist:

- One hand holding above their wrist and the other holding above their elbow.
- Lunge away with your body and lean your torso away from table to increase stretch.

ROM: Arm in flexion, moving from 80°–175°.

Traction: Arm overhead 150° out toward the corner of table on the diagonal.

PNF: Client pulls their scapula down to their opposite hip.

Cue for PNF: "Pull your shoulder blade down toward your opposite hip."

Stretch: Increase shoulder flexion moving from 80°–175°.

Repeat: PNF two or more times.

Transition: Traction the client's arm up at 90° to clear joint space (see Figure 6.4) before moving their arm to the next position at the top of the table. Make sure there is no pinching in shoulder. If there is, move their arm into less overhead flexion, more to the corner of the table.

8. Shoulder flexion overhead – pec major/minor, lat, triceps – FL, SFAL, DFAL, DBAL, SBAL

Figure 6.10 Arm overhead to top of table

Overhead shoulder flexion

Goal: To target tissues within the FL, SFAL, DFAL, DBAL, SBAL: pecs, lats and triceps.

To increase overhead flexion.

Client position: Supine with their arm overhead in shoulder flexion, with arm adducted as comfortably as possible.

Therapist:

- Lower your body into a squatting position.
- One hand placed above their elbow and your other hand above their wrist.
- Use your body weight to increase the stretch.

ROM: Overhead flexion.

Traction: Their arm overhead and continue increasing it after each PNF pass.

PNF:

- Get the client to contract and pull their scapula down toward their feet.
- Get the client to contract and push their arm up towards the ceiling.

Cue for PNF:

- "Pull your shoulder blade down toward your same hip."
- "Lift your arm up to the ceiling."
- Increase traction overhead.
- Move their arm down toward the floor into deeper flexion.

Repeat: Each one or two or more times.

9. Shoulder flexion overhead with horizontal adduction – rhomboids, lat, triceps – FL, DBAL, SBAL

Figure 6.11 Lat – top corner table

Transition: Walk the client's arm around into the next position.
(Lift their arm up and over, using repeating StretchWave™ mobilizations before stretching.)
Goal: To target tissues within the FL, DBAL, SBAL: rhomboids, lat, triceps.
To increase overhead flexion and horizontal adduction.
To stretch specific fibers of the Lats, rhomboids, functional and back arm lines.
Client position: Lying on side and reaches arm up overhead.
Therapist:
- Standing to the corner of the table place one hand on back of client.
- Scapula and other hand on their wrist.
- Clients arm is across your body.
- Lunge and lean away to increase the stretch.

ROM: Overhead flexion and horizontal adduction.
Traction: Arm up overhead into flexion.
PNF: Have them pull their scapula down to their same hip as they roll their body back down to table.
Cue for PNF: "Pull your shoulder blade back down to your same hip and roll your body back down to the table."
Stretch: Increase flexion overhead and horizontal adduction.
Repeat: PNF two or more times.

Transition: Walk their arm down and around towards the bottom corner of the table for the next stretch.

10. Shoulder horizontal adduction – traps, deltoid, posterior shoulder joint – SBAL

Figure 6.12 Trap across body – low corner pocket

Goal: To target tissues within the SBAL: – trap, posterior deltoid and superior posterior shoulder joint.
To increase shoulder depression, adduction.
Client position: Rolls back into a supine position from sidelying.
Their arm is across their body.
Therapist:

- From the previous position remain holding onto the client's wrist and walk down to the end of the table.
- Reach across and place your other hand on their shoulder as you traction their arm across their body.
- Use your body to lean away and increase the stretch.

ROM: Arm in adduction.
Traction: Traction their entire arm across front of body at 45°.

PNF: Have the client pull their arm and shoulder back and away from you and shrug their shoulder.
Cue for PNF: "Shrug up into my hand."
Stretch: Circle shoulder down toward table and around, then increase traction across their body.
Repeat: Two or more times.
Now, to finish the SFAL line by moving down to the hands. So often the hands are over worked and underappreciated!

11. "Dance of the Carpals": hand/wrist mobilization – carpal joint glides/capsule and tunnel stretch – SFAL, SBAL

SIGNATURE MOVE

Figure 6.13 Dance of the Carpals – hand traction

Goal: To gently stretch and slowly open up and release the joints and fascial tissue of the hand (carpals, metacarpals, phalanges) by doing the Dance of the Carpals, ending with traction of each finger! And that is what we call giving them some "finger love".
Client position: Supine, with arm across their body.
Therapist:

- From the previous position stand up and lean away focusing on the client's hand.
- Move from the wrist to the last joint of their fingers.
- Use both hands, work from the center of their palm, moving outward to the sides of their hand to open it up. For the fingers use one hand to stabilize and the other to traction the fingers and thumb.

Traction: Open all carpal, metacarpal and phalangeal joints and surrounding tissues for wrist, hand and fingers .

PNF: None

Cue for PNF: None

Stretch: This is done with the slow traction and oscillating of each joint of the fingers and thumb.

Repeat if necessary.

12a. "Dish Rag": shoulder protraction, trunk rotation – posterior shoulder and upper back – SPL, SBAL, DBAL

This is a signature stretch that is worth spending extra time on.

SIGNATURE MOVE

Figure 6.14a Dish Rag – at shoulder and upper spine

Goal: To target tissues within the SBAL, DBAL: posterior shoulder and upper back.
To increase upper spinal rotation.
Client position: Supine with their arm across their torso.
Therapist:
- Place one hand on back of their shoulder and the other on the back of their ribcage.
- Lean your own body into them for a strong contact.

ROM: Spinal rotation.
Traction: Think of lifting the shoulder girdle and ribcage up towards the ceiling and increase rotation.
PNF: Have the client roll their shoulder back down into the table.
Cue for PNF: "Roll your shoulder back down to the table."
Stretch: Increase the spinal rotation.
Repeat: Two or more times.

12b. "Dish Rag": full spinal rotation – erector spinae, quadratus lumborum, rhomboids – SPL, FL

Figure 6.14b Dish Rag – at shoulder and hip

Goal: To target tissues within the SPL, FL: posterior shoulder and back including erector spinae, quadratus lumborum, rhomboids.
To increase spinal rotation.
Client position: Supine with arm across torso.
Therapist:

- Position one hand on their shoulder and your other hand moves down to their hip on the same side.
- Rotate their torso down towards the table as you press their hip open and back to table.
- Continue moving your top hand down their spine until you have reached their hip as you repeat the PNF.
- Do one last "Dish Rag" squeeze of the tissue on the client's exhalation.

ROM: Spinal rotation.
Traction: Think of lifting the shoulder girdle and ribcage up towards the ceiling and increase rotation with your top hand and press their hip back down into the table with your bottom hand.
PNF: Have client roll their entire body back down into the table.
Cue for PNF: "Roll your entire body back down to the table."

Stretch: Increase the spinal rotation in opposite directions for the upper and lower body.
Repeat: Two or more times.
Transition: Continue to walk slowly around the top of the table.
Ask the client to slide over to the side of the table for the next stretch.

13. External rotation – internal rotators – SFAL, DFAL

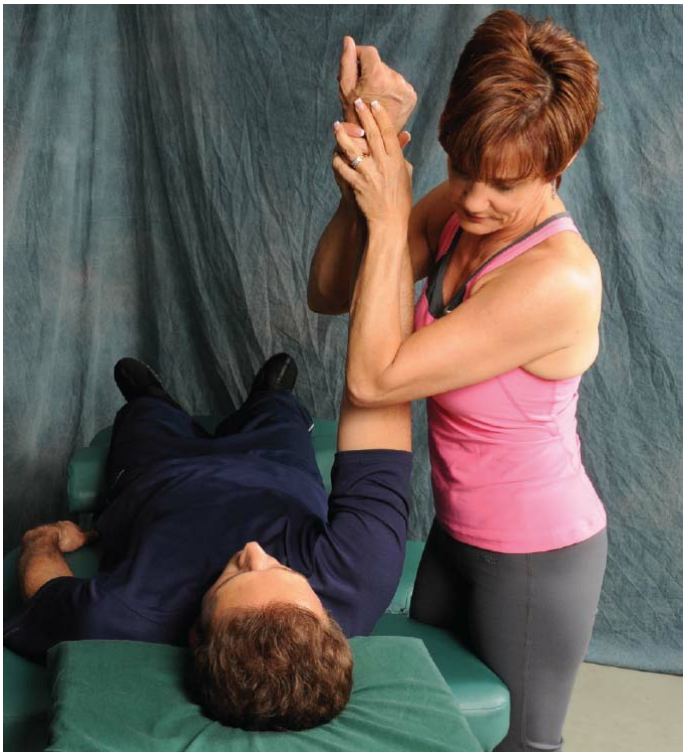

Figure 6.15a Traction arm up at 90° for preparation

SIGNATURE MOVE

Figure 6.15b Rotator cuff – external rotation to stretch internal rotators

Figure 6.15c Traction out

Figure 6.15d PNF

Figure 6.15e Stretch

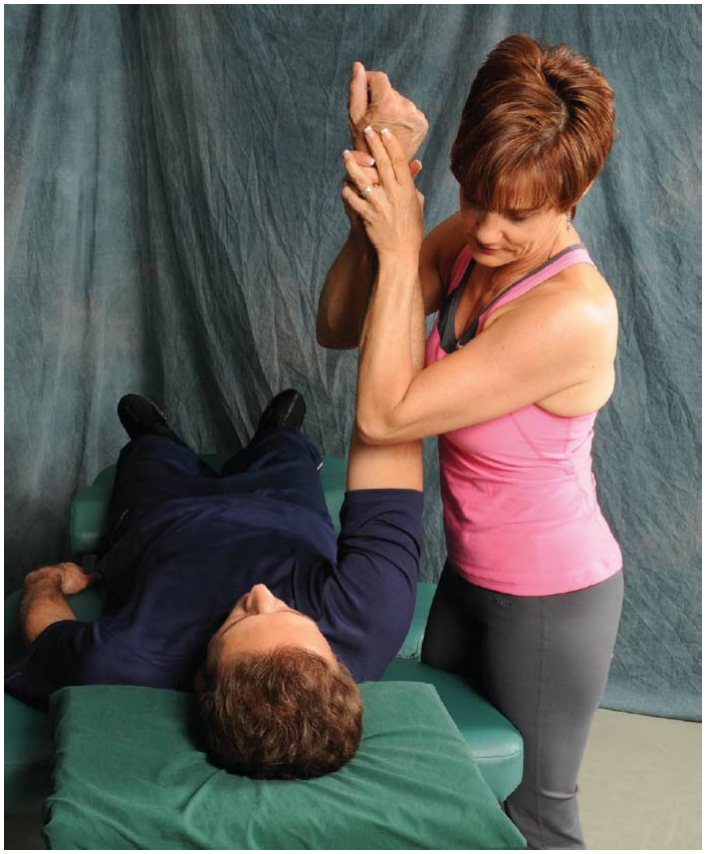

Figure 6.15f Traction arm up at 90°

Think of the simple cues: traction (out), drop (your body down), lift (hips up).

Traction is the key to success for this series.

Goal: To target tissues within the SFAL, DFAL: internal rotators of the cuff. To increase external rotation.

Client position: Supine with their arm out and bent at a 90° angle. Have them move to the edge of the table. They need to be far over enough for the joint to align with the edge of the table. This is necessary so their scapula remains on the table for stability and the humerus can be abducted down towards the floor.

Therapist:

- From the last position, turn around so you are facing the top of the table.
- Hook your inside arm around the bend of their elbow and grasp your other arm for stability.
- Place your other hand very gently around the medial aspect of their wrist. Please note this is only a light contact point and should not have any real pressure applied.
- Step away from the table into a parallel lunge, keeping your body squared off.
- Lean away with your hips for the traction.

- Bend at the waist and drop your own body down to achieve the arm abduction.
- Lift your hips up in order to rotate their entire shoulder and arm into deeper external rotation. Do not push down on the arm.

Repeat the sequence for each PNF pass: Out, down, lift.

ROM: External rotation.

Traction:

- Traction arm up at 90° to begin.
- Traction shoulder out to side at a 90° angle for the shoulder and the elbow.
- Rotate into deeper external rotation by lifting their elbow upward.

PNF: Get the client to internally rotate their entire shoulder toward the ceiling. Traction as you gently stretch it into external rotation.

Cue for PNF: "Press your arm up into me."

Stretch: Increase external rotation.

Repeat: Two or more times.

14. Internal rotation – external rotators – DBAL

Figure 6.16a Internal rotation to stretch external rotators

Figure 6.16b Close up of therapist's and client's position. Aim client's hand in a diagonal direction toward their hip pocket. Allow your hips to rotate slightly towards the table to increase stretch.

Figure 6.16c Traction

Figure 6.16d PNF

Figure 6.16e Stretch

Goal: To target tissues within the DBAL: internal rotators of the cuff.
To increase internal rotation.

Client position: Supine with their arm out to their side and bent at a 70° angle. Get the client to move to the edge of the table – far enough for the joint to align with the edge of the table. This is necessary to allow their scapula to remain on the table for stability.

Therapist:

- From the last position turn your body around and face the foot of the table.
- Bring the client's arm down to a 70° angle.
- Hook your inside arm around the bend of their elbow and grasp your other arm for stability.
- Place your other hand very gently around the lateral aspect of their wrist. Please

note this is only a light contact point and should not have any real pressure applied.

- Step away from the table into a parallel lunge, keeping your body squared off.
- Lean away with your hips for the traction.
- Bend at the waist and drop your body down to achieve the arm abduction.
- Lift your hips up to rotate their entire shoulder and arm into deeper internal rotation. Do not push down on the arm.

Repeat the sequence for each PNF pass: Out, down, lift.

ROM: Internal rotation.

Traction: Traction shoulder out at 70° angle for the shoulder and the elbow. Rotate into deeper internal rotation by lifting their elbow upward.

PNF: Get the client to externally rotate their entire shoulder towards the floor. Traction as you gently stretch it into internal rotation.

Cue for PNF: "Press your arm up into me."

Stretch: Increase internal rotation.

Repeat: Two or more times.

Repeat the sequence again for each PNF pass: Out, down, lift.

- Face the table and traction the arm up at 90 ° one more time.
- Turn back around to face the top of the table for the next stretch.

15. Shoulder horizontal abduction/ER (at 90°) – pec major – SFAL, FL

Figure 6.17a Pec major

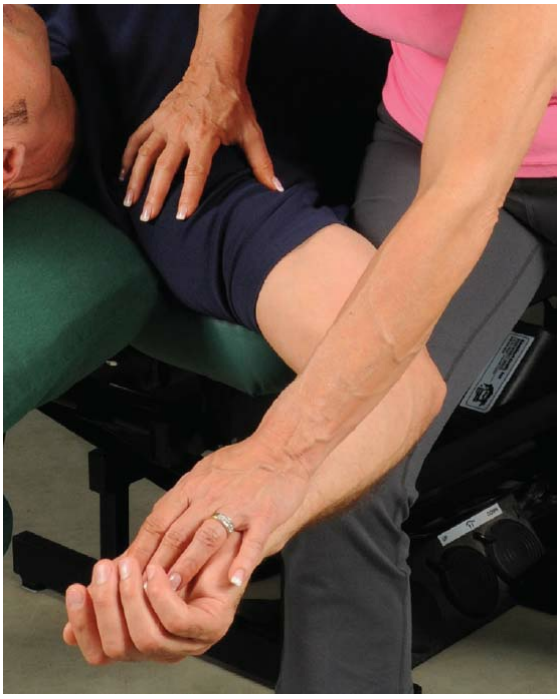

Figure 6.17b Pecs hand placement

Figure 6.17c Transitional hand position

Figure 6.17d Elbow extended

Goal: To target tissues within the SFAL, FL: pec major.
To increase shoulder abduction, external rotation and elbow extension.

Client position:

- Supine at the edge of the table with their elbow and lower arm completely off the table. They need to be over far enough for the joint to align with the edge of the table. This is necessary to allow their scapula to remain on the table for stability arm at the edge of the table.
- Externally rotate their arm at 90° from the shoulder and elbow.
- Slowly move forearm into full extension at elbow.

Therapist:

- From the last position facing the top of the table, place your inside hand on the outer aspect of their pec major and, with your outside arm, reach out and place your hand on the medial aspect of their wrist.
- Lunge forward onto your inside leg and provide a support for their arm with your leg – like an extension of the table.
- Use your body instead to increase the stretch by leaning forwards.

Transitional hand position:

- Move your inside hand down to the medial aspect of their elbow.
- Move their elbow joint into full extension.

ROM: Shoulder abduction, external rotation and elbow extension.

Traction: Shoulder out at 90°, abduct, externally rotate and into elbow extension.
PNF:
- Get the client to press their entire arm (maintain a 90° angle) towards their chest by contracting their pecs.
- Contract their arm into internal rotation.
- Have the client do a combination of both movements together by contacting their pecs and rotator cuff.
- Get the client to contract and lift their entire arm up towards the ceiling.

Cue for PNF:
- "Press your entire arm up into me." or "Do a pec deck move."
- "Rotate your arm up into me."
- "Now do both press up and rotate."
- "Press your entire arm up to me."

Stretch: Increase external rotation, abduction and elbow extension.
Repeat: Two or more times.
Finish the stretch by straightening their arm all the way out by extending the elbow and moving their arm down towards the floor to get all fiber angles! Remember to use your body weight not just your arms.

16. Shoulder extension/IR, elbow extension – biceps brachii – DFAL

Figure 6.18a Biceps

Figure 6.18b Hand position

Figure 6.18c PNF

Figure 6.18d Stretch

Goal: To target the tissues within the DFAL: biceps brachii.

Client position: Supine. The client moves over to the side of the table with their arm off the side of the table.

Therapist:

- From the last position drop down into a kneeling position positioning your body to the side of the table to begin.
- Wrap your finger around the inside of their arm and grasp their wrist with your other hand.
- Use your body weight by dropping down to traction their arm – don't just pull with your arms.
- Take their arm into extension towards the top of the table.
- Internally rotate their arm. Move your entire body to move them into internal rotation.
- Now slowly and gently pronate their hand, as this is a full fascial line stretch.

ROM: Extension, internal rotation wrist pronation.

Traction: Traction arm out and down towards floor.

Traction increases internal rotation.

Use your body to traction by dropping your weight down to the floor.

PNF:

- Get the client to contract their entire arm, moving into flexion.
- Get them to attempt a bicep curl, flexing their elbow and supinating hand.

Cue for PNF:

- "Press your arm up into me."
- "Do a bicep curl."

Stretch: Increase extension towards the top of the table, increase internal rotation, increase pronation of the wrist. Play with different angles to get both heads of the biceps.

Repeat: Two or more times.

Repeat the entire series from 1–15 on the other side.

17. Setting the shoulder

Just as we did with the sacrum, we feel it is important to stabilize the shoulder girdle after stretching.

- Traction arm up at 90°.
- Traction arm down at neutral.
- Press shoulder and wrist down into table at the same time.
- Place one hand on the front of their shoulder and the other on top of the wrist with their hand flat on the table palm side down.

- To complete the lengthening, gently pull their finger tips down towards the foot of the table and flatten the palm down into table.
- Gently rocking the entire arm back and forth between the shoulder and wrist, find a still point and pause for a moment…with your heart over their heart and breathe together.

D. ROM Evaluation Warm-up and FST-PNF Stretch

Key points that are especially important for neck work:

1. There is a much higher level of sensitivity in the neck area due to the extensive amount of neural and other delicate and/or senstitive tissue.
2. It is often the most protected and personal area on someone and needs to be handled with the utmost care.
3. It is the ultimate area to work as far as trust is concerned.
4. There is an even stronger need for the client to feel confidence from the therapist.
5. Slow and gentle movements are important.
6. Work seated if possible so you can have minimal tension in your own body.
7. Move through another pathway following the stretch to return back to neutral.
8. Remember: less is more – especially with neck work!

Neck work: Do stretches 4–7 to one side then repeat on the other side.

1. Shoulder depression – bilateral traps – SBAL

Figure 6.19 Shoulder depression

Goal: To target tissues within the SBAL: traps.

To settle the shoulders down and bring client to a more parasympathetic state.

Client position: Supine and relaxed.

Therapist:

- Place both of your hands on the top of client's shoulders with your fingertips lifted.
- Press their shoulder down towards their feet.
- "Kitty Cat" move by alternately pressing one shoulder down at a time.

ROM: Depression of shoulders.

Traction: None

PNF: Have them shrug into your hands.

Cue for PNF: "Shrug up into my hands."

Stretch: Increase shoulder depression.

Repeat: PNF two or more times.

2. Neck traction – cranial/cervical joint capsules and tissues – SBAL, DBAL, SBL, DFL

Client position: Supine and relaxed.

Goal: To target tissues within the SBAL, DBAL SBL, DFL: sub occipitals, decompress upper cervical joints and increase relaxation through parasympathetic activation.

Therapist: Preferably seated (note that there are many ways to do this).

- Place your hands on the back of their neck down towards the shoulders to begin.
- Slowly slide along the tissue until your hands land under the client's occipital ridge.
- Allow your hands to cup both regions around the mastoids as you traction.
- Lean back in your chair to increase the stretch by using your body – not just your hands.

ROM: Cranial/upper cervical decompression.

Traction: Gently compress in toward the center of the neck, as you simultaneously traction by hooking the mastoids and lean back.

PNF: None

Cue for PNF: None

Stretch: Increase space between the cranium and atlas, and on through the upper cervical joints while stretching all tissues overlying the same and on down through the neck as far as possible.

Repeat: Two or more times.

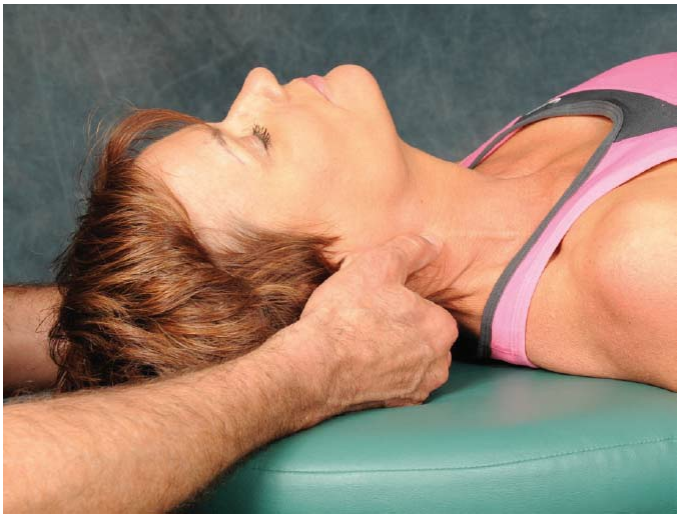

Figure 6.20 Neck traction

3. Sub-occipital traction ROM – sub cranial joint capsule, tissues – SBL, SBAL, DBAL

Goal: To target tissues within the SBL, SBAL, DBAL: decompress cranial cervical and upper cervical joints, stretch cervical joint capsules and all overlying tissues, stimulate parasympathetic state, increase relaxation.

Client position: Supine and relaxed.

Therapist: From last position.

- Slowly slide along the tissue until your hands land under the client's occipital ridge.
- Allow your fingertips to gently palpate as you lengthen their SBL.
- Curl your finger pads up and around their occipital ridge.
- Allow the weight of their head to really drop into your hands.
- Use a mini stretch wave motion.

ROM: Upper cervical traction, flexion.

Traction: Lean back in your chair to increase the traction and stretch of upper cervical joints using your body and not just your hands.

PNF: None

Cue for PNF: None

Stretch: Increase upper cervical flexion, decompress upper cervical joints.

Repeat: Two or more times.

Figure 6.21 Sub-occipital neck traction, ROM

4. Traction, upper cervical flexion – cervical/upper thoracic extensors – SBL, SBAL, DBAL

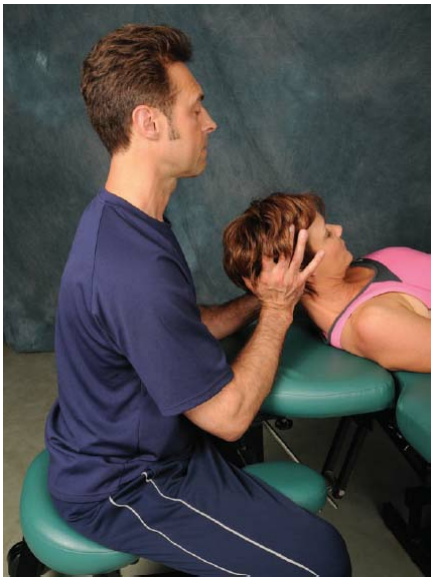

Figure 6.22a Traction in flexion

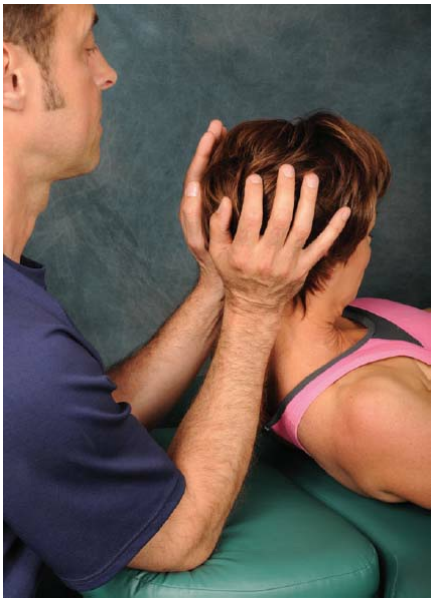

Figure 6.22b PNF

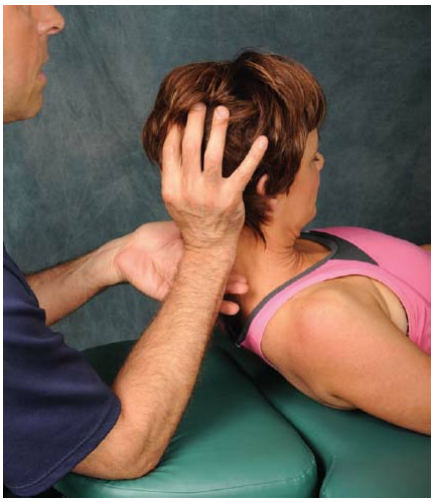

Figure 6.22c Release

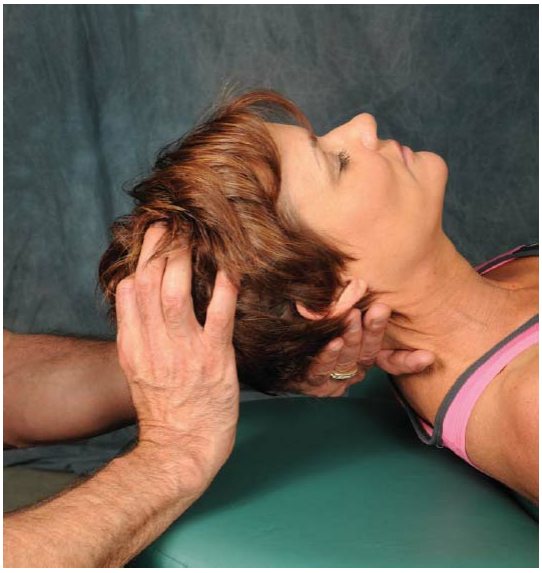

Figure 6.22d Float back

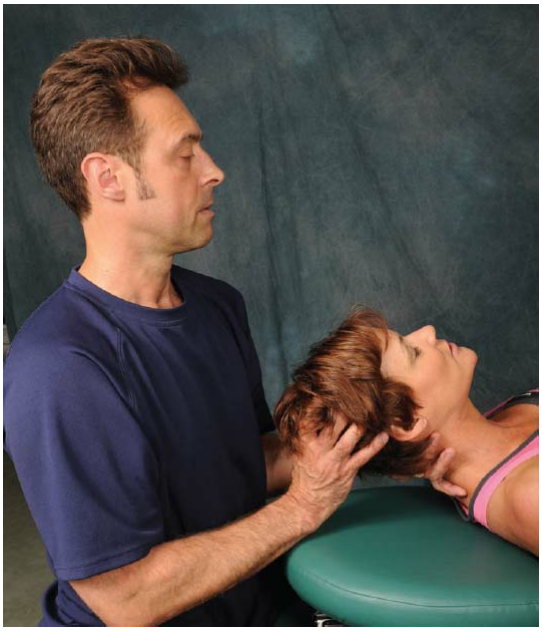

Figure 6.22e Keep floating back

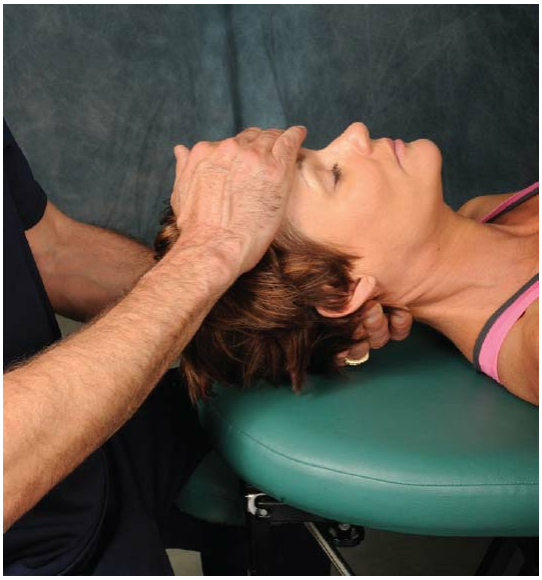

Figure 6.22f Traction in neutral (note variation of hand position)

Goal: To target tissues within the SBL: extensors of the neck and upper back.
Client position: Supine and relaxed.
Therapist:
- Place both of your hands on their occipital ridge – cup their head.
- Turn your fingertips slightly so they are now pointed up to the ceiling.
- The heels of your hands are under the occiput for a firm contact.
- Lift their head upward towards ceiling with traction.
- Increase the stretch by maintaining traction as you guide their chin to their chest into gentle flexion.
- Be careful not to restrict their airway.
- Use care when releasing the stretch back to starting position by supporting their head, moving slowly.
- Encourage the cervical curve as their heads floats back down.
- Repeat points 2–6 again for best results.

ROM: Neck flexion.
Traction: Gently traction head up towards ceiling and into flexion.
PNF: Get the client to gently push their head back into your hands in extension.
Cue for PNF: "Gently push your head back into my hands."
Stretch: Increase neck flexion.
Repeat: PNF two or more times. Mobilize varied angles to find then stretch all of the tight fibers.

5. Neck rotation right – left cervical rotators – LL, SPL, FL

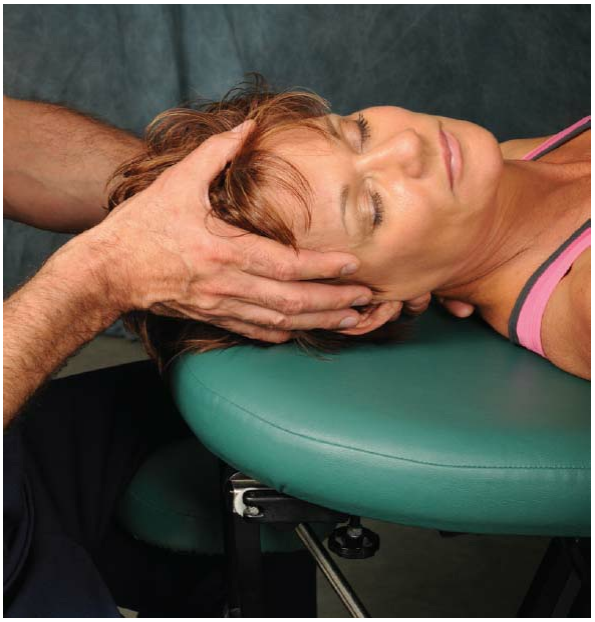

Figure 6.23a Neck rotation to right

Figure 6.23b Deeper rotation to right (PNF)

Figure 6.23c Return to neutral

Goal: To target tissues within the LL, SPL, FL: cervical rotators (in this case, left side).
To increase neck rotation to the right.
Client position: Supine with head rotated to the right as far as is comfortable. Make sure their head is only in rotation and not in any forward or lateral flexion or extension.
Therapist:

- Place one hand on the back of the head and the other one on the side of their head in the temporal area. Be careful to avoid their eyes.
- Turn the client's head to the right side on the table.
- Upon release of PNF, slowly increase ROM.
- Slowly circle their head around through flexion and float back it into extension to return to neutral to finish.

ROM: Neck rotation.
Traction: Think of creating space between their shoulder and neck.
PNF: Client turns eyes and head to opposite direction.
Cue for PNF: "Turn your eyes and head to the ceiling."
Stretch: Increase neck rotation to the right.
Repeat: PNF two or more times. Play with angles to find all of the tight fibers.

6. Neck lateral flexion right – left lateral flexors – LL, SPL, SBL, SBAL, DBAL, DFL

Figure 6.24a Lateral flexion

Figure 6.24b PNF

Figure 6.24c Return to neutral

Goal: To target tissues within the LL, SPL, SBL, SBAL, SDAL, DFL: lateral fibers of the neck (in this case, left side). To increase lateral flexion.

Client position: Supine with neck side bent into lateral flexion.

Therapist:

- Keep the back of the client's head on the table, slide it to the right moving the ear toward their shoulder.
- Place one hand on the top of client's shoulder and the other hand on the side of their head. You can cross your arms as shown in Figure 6.22b or open them.
- Gently press down on their opposite shoulder as you traction and stretch their head away.
- Be careful not to let their head tilt backwards and keep their nose pointed to ceiling.
- Increase ROM by gently pressing down on their shoulder as you increase their neck flexion with traction.
- Upon release of PNF, gently and slowly increase shoulder depression and neck flexion.
- Slowly circle their head around through flexion and float it back into extension to return to neutral to finish.

ROM: Lateral flexion.

Traction: Think of creating space between their shoulder and neck.

PNF:

- Have client shrug their left shoulder up into your hand.
- Have the client try to push their head gently back into your hand.

Cue for PNF:

- "Shrug your shoulder up into my hand."

• "Press you head back into my hand."

Stretch: Increase lateral flexion.

Repeat: PNF two or more times. Play with angles to find all of the tight fibers.

7. Combination of neck lateral flexion and rotation right – left cervical lateral flexors, rotators, extensors – LL, SPL, SBL, SBAL, DBAL, DFL

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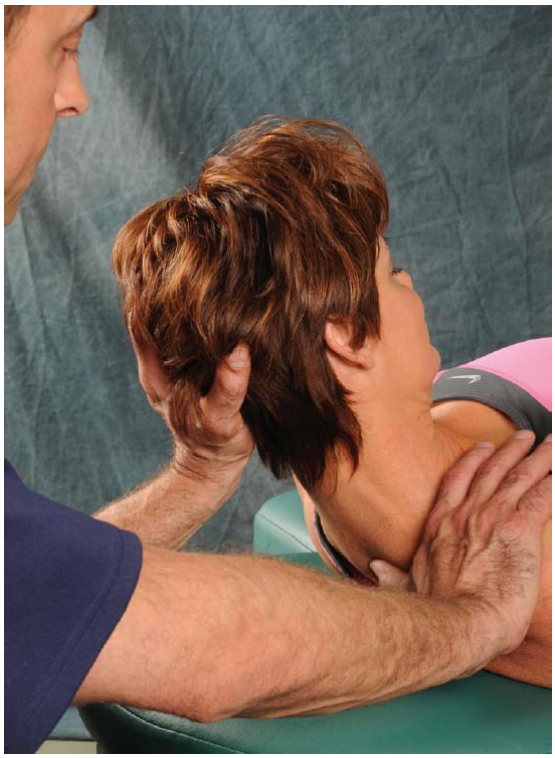

Figure 6.25a Combo lateral rotation and flexion

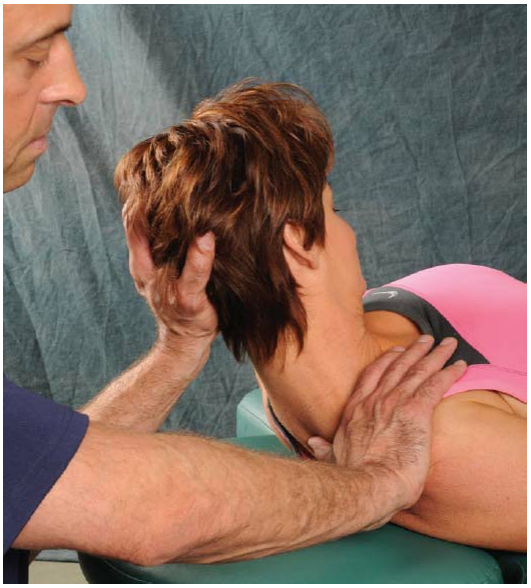

Figure 6.25b Rotate to one side

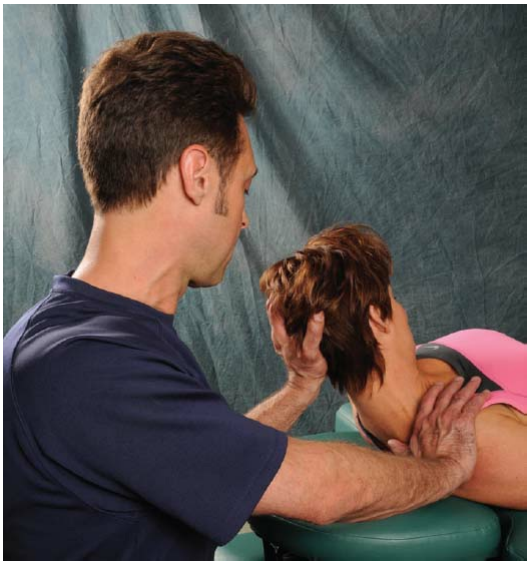

Figure 6.25c Find R1

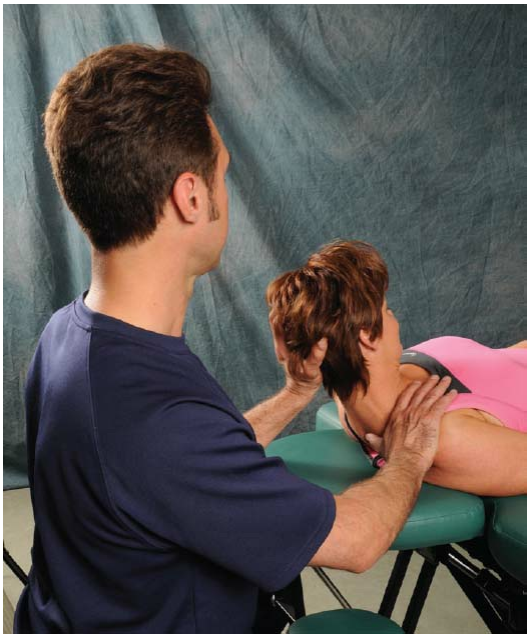

Figure 6.25d PNF

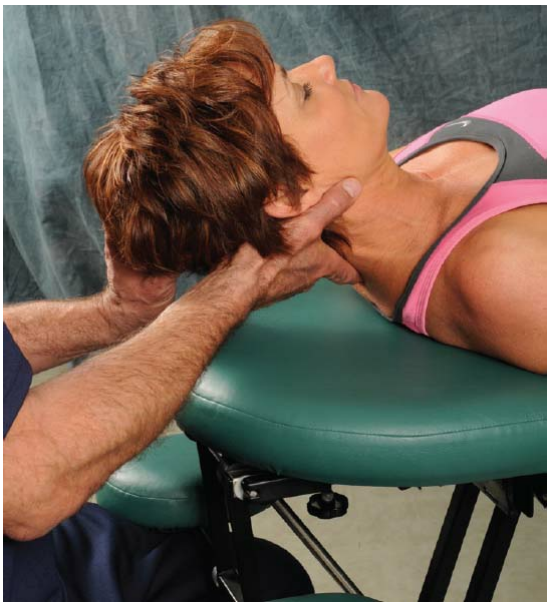

Figure 6.25e Return to neutral

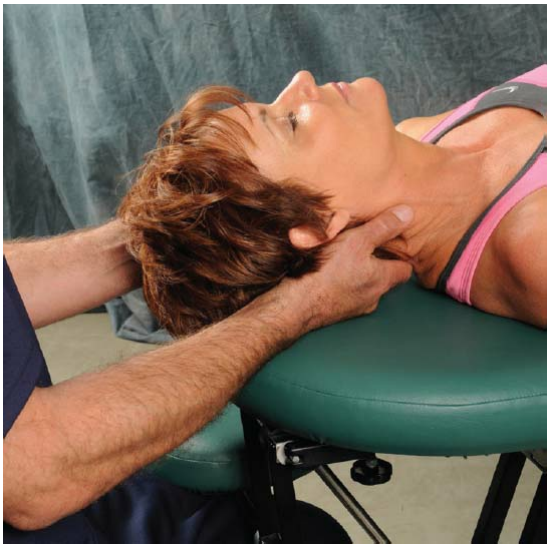

Figure 6.25f Traction

Goal: To target tissues within the LL, SPL, SBL, SBAL, DBAL, DFL: left cervical lateral flexors, rotators, extensors. To increase lateral flexion and rotation.
Client position: Supine with head lifted into flexion and rotation.
Therapist:
- Place one hand on the back of the client's head and the other one on the top their shoulder. Lift their head up into forward flexion.
- Rotate their chin towards their chest.
- Press their opposite shoulder down as you lift the head up and rotate to find R1.
- Upon release of PNF, increase ROM with shoulder down and neck flexion.
- Repeat PNF with shoulder, head and then both together.
- Move through neck extension to return to neutral.
- Traction to finish.

ROM: Increase lateral flexion and rotation.
Traction: Think of creating space between their shoulder and neck.
PNF:
- Have client press their shoulder up into your hand.
- Have client press their head back into your hand.
- Have client contract both their shoulder up and their head back into you at the same time.

Cue for PNF:
- "Press your shoulder up into my hand."
- "Press your head back into my hand."
- "Now contract both at the same time - shoulder and head."

Stretch: Increase lateral flexion and rotation.
Repeat: PNF of each pattern two or more times if needed. Focus on the area that is the tightest. Play with angles to find all of the tight fibers.
Repeat 4–7 on the other side.

8. Anterior neck traction - anterior neck, supra/infra hyoid – DFL

Figure 6.26a Anterior neck traction

Figure 6.26b Extension

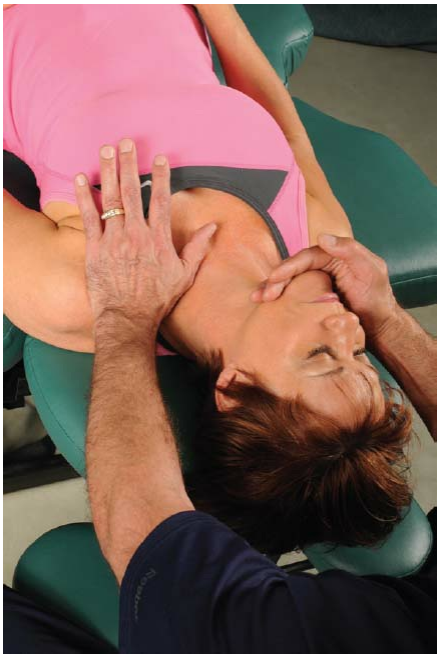

Figure 6.26c Rotate to side

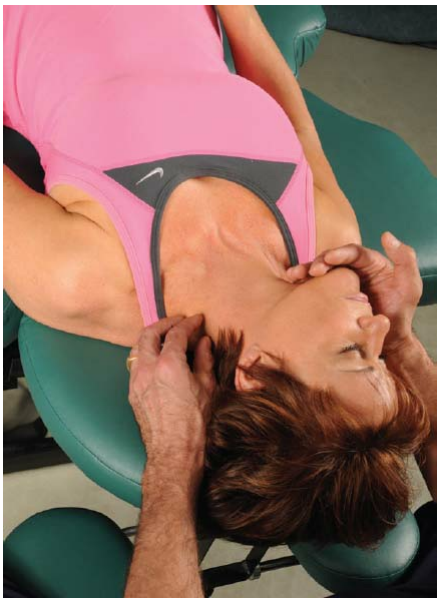

Figure 6.26d Deeper stretch

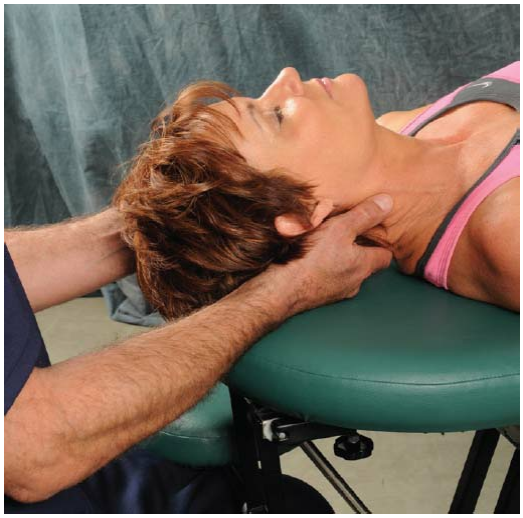

Figure 6.26e Return to neutral and traction

Take your time with this one and move extremely gently and slowly.

Goal: To target tissues within the DFL and in the front of the neck: anterior neck, supra/infra hyoid.

To increase neck extension and rotation.

Client position: Supine with neck in extension and rotation.

Therapist:

- Place your hands on top of both clavicles with finger tips lifted up.
- Drop your wrists down and hook your thenar eminence into the tops of their clavicles.
- Gently press down towards feet from above the clavicles doing "Kitty Cat" move.
- Get the client to breathe deeply. On exhale, slowly stretch tissue down – rocking the clavicles so they can lift their chin slightly up to ceiling.
- Now place one of your hands under their chin.
- Press the one clavicle down as you take their head back into extension making little circles with their chin.
- Add head rotation. Keep moving in little circles to increase stretch.

ROM: Neck extension and rotation.

Traction: Think of creating space between their clavicles and their jaw.

PNF: None

Stretch: Increase neck extension and rotation. Play with angles to find all of the tight fibers.

Repeat on the other side.

Finishing moves: To complete the neck series, we traction as we began but with a reverse order of small sub-occipital traction then out to global with full neck traction.
And as we did for the setting of the sacrum and the shoulder, we also finish the series by setting the cranium to stabilize the neck musculature and reset the proprioception.

9. Suboccipital traction – sub cranial joint capsule, tissues – SBL, SBAL, DBAL

Figure 6.27 Sub-occipital traction

Goal: To target tissues within the SBL, SBAL, DBAL: sub cranial joint capsule, tissues.
Client position: Supine and relaxed.
Therapist:
- Slowly slide along the tissue until your hands land under client's occipital ridge.
- Again allow your fingertips to gently palpate as you lengthen their SBL.
- Curl your finger pads up and around their occipital ridge.
- Allow the weight of their head to really drop into your hands.
- Use mini stretch wave motion.

ROM: Upper neck flexion.
Traction: Lean back in your chair to increase the traction and stretch using your body and not just your hands.
PNF: None
Cue for PNF: None
Stretch: Increase upper neck flexion.
Repeat: Two or more times.

10. Full traction – cranial cervical joint capsules, overlying tissues – SBL, SBAL, DBAL

Goal: To target tissues within the SBL, SBAL, DBAL: increase general neck ROM, decompress cranial cervical joints and stretch overlying tissues, increase relaxation.

Client position: Supine and relaxed.

Therapist: Preferably seated.

- Place one hand below and hook occipital ridge; place other hand opposite on frontal bone.

ROM: Traction, decompression.

Traction:

- Slightly compress hands together as you lean body back.
- Progress from light to deeper traction as tolerated.
- Lean back in your chair to increase the stretch using your body and not just your hands.

PNF: None

Cue for PNF: None

Stretch: Increase cervical joint space and tissue length.

Repeat: Two or more times.

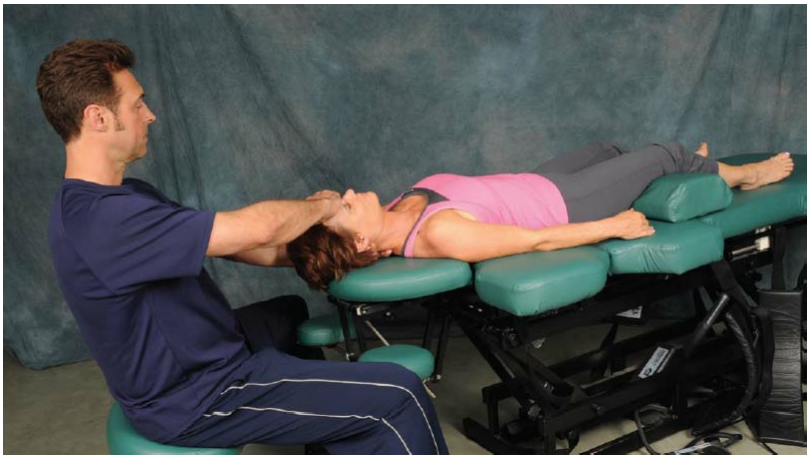

Figure 6.28 Traction

11. “Cranium set”: sub cranial flexion – cranio cervical extensors - DFL

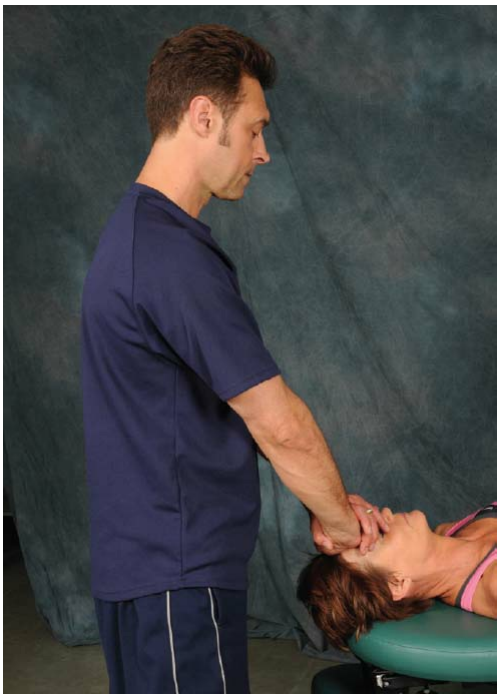

Figure 6.29a Set the cranium

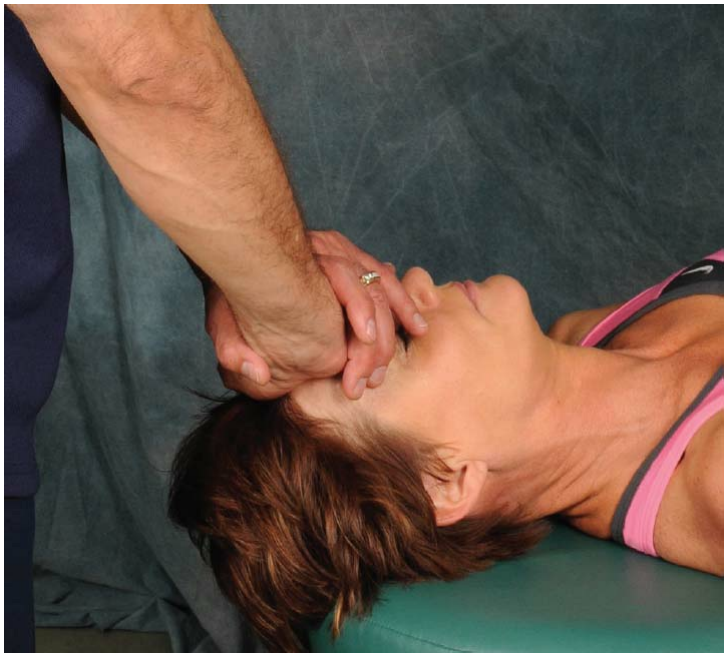

Figure 6.29b Hand placement

Goal: To stabilize the neck musculature and reset the proprioception.
Client position: Supine
Therapist: Standing

- With the client's head on the table, place your hands on their forehead.
- Gently tuck client's chin in as they lengthen the back of their neck.
- Hold this position for a few moments as they breathe and relax.
- Find a still point positioning your heart above their heart and breathe together.

12. Shoulder depression – bilateral traps – SBAL – repeat once more to finish

Figure 6.30 Shoulder depression repeat

Goal: To target tissues lying within the SBAL: traps.
To settle shoulders down and check to see if there are any changes in the tissue?
Client position: Supine and relaxed.
Therapist:

- Place both of your hands on the top of the client's shoulders with your fingertips lifted.
- Press their shoulder down toward feet.
- "Kitty Cat" move by alternating pressing one shoulder down at a time.

ROM: Depression of shoulders.
Traction: None
PNF: Get them to shrug into your hands.
Cue for PNF: "Shrug up into my hands."

Stretch: Increase shoulder depression.
Repeat: PNF two or more times.

E. Sitting Stretches

1. Shoulder extension/adduction – anterior deltoid and pecs – SFAL, FL

Figure 6.31a Shoulder extension/adduction

Figure 6.31b Close-up (hand position)

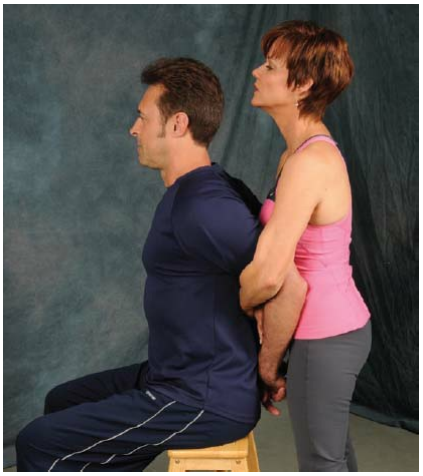

Figure 6.31c PNF

Goal: To target tissues lying within the SFAL, FL: anterior deltoid and pecs. To increase extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.

Client position: Sitting with their feet hip distance apart and firmly planted flat on the floor. Get them to take their arms behind their body in abduction and interlace their fingers.

Therapist:

- Wrap your arms around the client above their elbows and gently squeeze them together.
- Grasp your own arms for support, if needed.
- On their exhalation, squeeze their elbows closer together as they lift their chest up.

ROM: Extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.

Traction: Think of opening their chest as you pull their elbows closer.

PNF: Get them to contract their chest and anterior shoulders to pull away and out of your hold.

Cue for PNF: "Pull your arms forward and out of my hold."

Stretch: Increase extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.

Repeat: PNF two or more times.

2. Shoulder extension/adduction, elbow flexion – anterior deltoid, pecs, anterior joint capsule – SFAL, FL

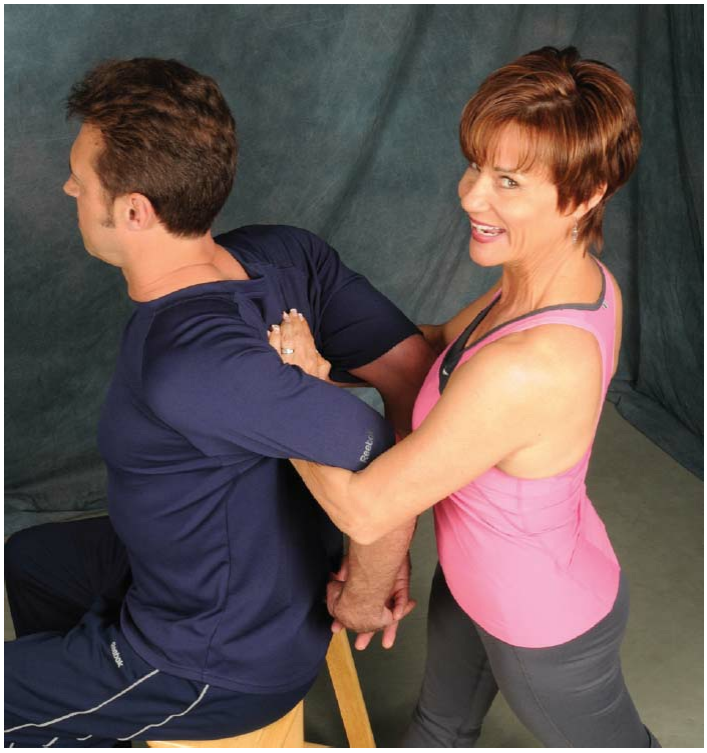

Figure 6.32a Shoulder extension/adduction, elbow flexion

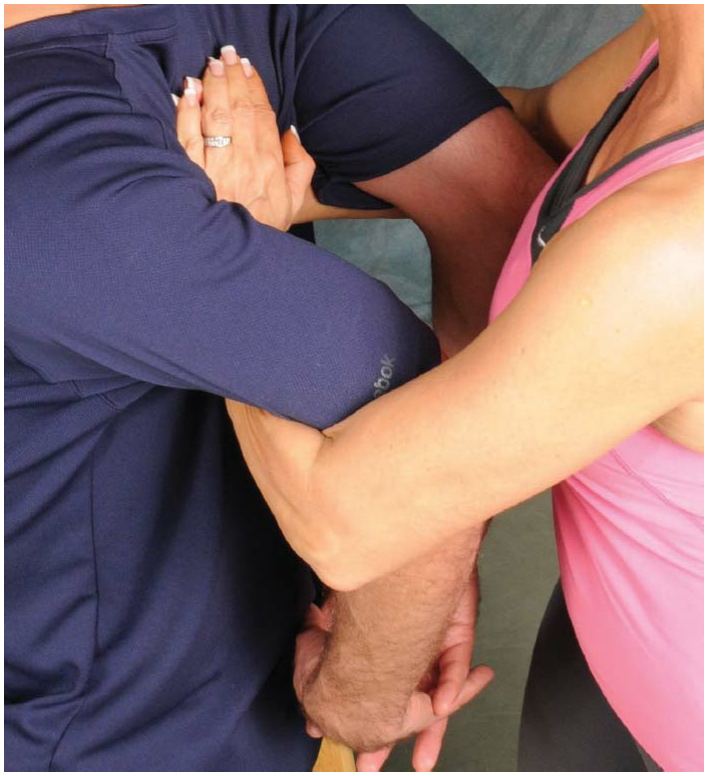

Figure 6.32b Close up of hand position

Goal: To target tissues lying within the SFAL, FL: anterior deltoid, sternal fibers of pecs, anterior glenohumeral joint capsule.
To increase extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.
Client position: Sitting with their feet hip distance apart and firmly planted flat on the floor. Get them to take their arms behind their body in abduction and interlace their fingers, while keeping their posture upright.
Therapist:

- From the last stretch, flatten your palms against the client's back and press into it.
- On their exhalation lift their arms higher and squeeze their elbows closer together as they lift their chest up.
- Keep walking your hands up their back and maintain their elbows moving closer.
- Use your body to lift their arms up – not just your arms.

ROM: Extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.
Traction: Think of pressing their sternum forward as their arms float upwards.
PNF: Get the client to try to pull away, out of the hold.
Cue for PNF: "Pull your arms up and out of my hold."

Stretch: Increase extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.
Repeat: PNF two or more times. Play with the angles to target more fibers.

3. Hands behind head: shoulder abduction, elbow flexion – pec major, anterior chest – SFAL, FL

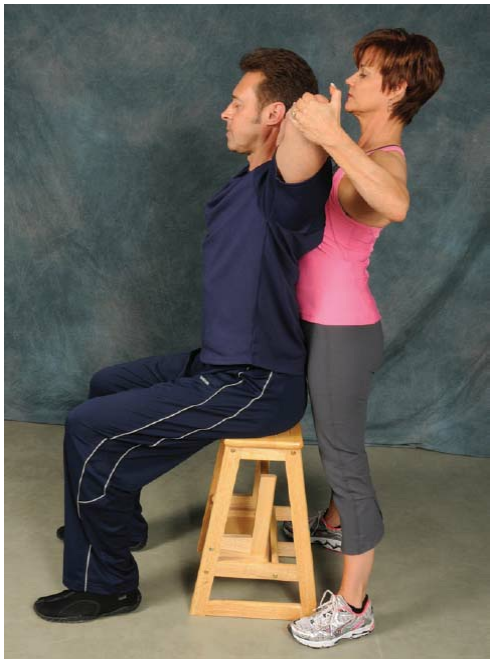

Figure 6.33a Pec major (anterior chest)

Figure 6.33b Pec major

Goal: To target tissues lying within the SFAL, FL: all the fibers of the anterior chest, pec major.
To increase extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.
Client position: Sitting with their feet on the floor, get them to take their arms behind their body in abduction and interlace their fingers. Allow them to arch back a little bit.
Therapist: Place your hand around and on the outsides of their elbows.
ROM: Increase extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.
Traction: Gently traction elbows upward towards ceiling and open back to stretch.
PNF: On PNF have client try to close their elbow toward their face.
Cue for PNF: "Squeeze your elbows together."
Stretch: Increase extension, shoulder abduction, horizontal abduction and lateral rotation of the humerus.
Repeat: PNF two or more times. Play with the angles to target more fibers.

4. Sitting lats: shoulder abduction, elbow flexion – lats, teres major, QL and intercostals – FL, SPL, DFL, LL, DBAL

SIGNATURE MOVE

Figure 6.34a Sitting lats starting position

Figure 6.34b PNF

Figure 6.34c Stretch

Figure 6.34d Target tissues within primarily the Functional and Lateral Lines

This stretch targets a great deal of tissues and hits multiple angles and fibers. So really explore the potential here!

Goal: To target tissues lying within the FL, SPL, DFL, LL and DBAL: lats, teres major, QL and intercostals.
To increase flexion, lateral rotation and abduction of humerus, lateral flexion, rotation and extension of the trunk.
Client position: Sitting with their feet hip distance apart and firmly planted flat on the floor.

- Get the client to lengthen their spine upward.
- Then get them to reach their arm up overhead then bend elbow behind back into flexion.

Therapist:

- Stand behind your client with your feet firmly planted, hip distance apart.
- Make sure you are close enough to have contact with the client's back so you can steer them through the stretch.
- As client reaches their arm up into flexion, assist by tractioning arm upward and lift it to clear joint.
- Wrap your arm around the front of their arm and place your hand on the medial side of their elbow. Your other hand grasps the medial aspect of their wrist.
- Continue tractioning up from the elbow.

- On stretch, traction up and over to the side, lifting their arm upward and back into you.
- Use your body to help guide their movement and increase traction.

ROM: Flexion, lateral rotation and abduction of humerus, lateral flexion, rotation and extension of the trunk.

Traction: Think of creating space between the top of the pelvis and the humerus.

PNF: Have client contract and bend laterally to one side. They will attempt to pull their elbows and ribs toward the floor.

Cue for PNF: "Pull your body down toward your hip."

Stretch: Increase flexion, lateral rotation and abduction of humerus, lateral flexion, rotation and extension of the trunk.

Repeat: PNF two or more times. Play with the angles to target more fibers.

5. Sitting lats: shoulder abduction, elbow flexion, trunk rotation – lats, teres major, QL and intercostals – FL, SPL, DFL, LL, DBAL

Rotation component

Figure 6.34e Sitting lats with rotation

Open chest stretch

From the last stretch, to add another component of Rotation PNF.

Goal: To target tissues lying within the FL, SPL, DFL, LL and DBAL: lats, teres major, QL and Intercostals.
To target the fibers involved in rotation component.
To increase flexion, lateral rotation and abduction of humerus, lateral flexion, rotation and extension of the trunk.
Client position: Sitting, as for previous position.
Therapist: Standing, as for previous position. Lean away with your body to increase traction and stretch.
ROM: Flexion, lateral rotation and abduction of humerus, lateral flexion, rotation and extension of the trunk.
Traction: Think of creating space between the top of the pelvis and the humerus.
PNF: Get the client to twist torso and pull their elbow down toward the opposite hip.
PNF cue: "Pull you elbow down to your opposite knee."
Stretch: Increase flexion, lateral rotation and abduction of humerus, lateral flexion, rotation and extension of the trunk.
Repeat: PNF series two or more times. Play with the angles to target more fibers.

6. Sitting triceps: shoulder abduction, elbow flexion – triceps – DBAL

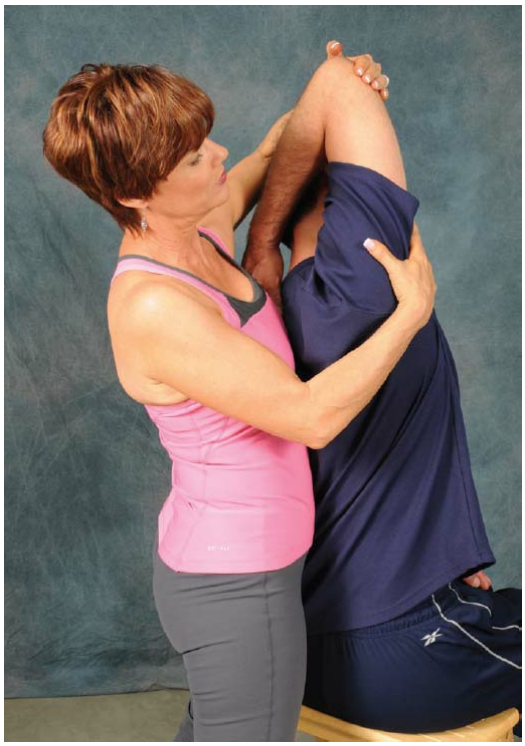

Figure 6.35a Sitting triceps PNF (target proximal fibers)

Figure 6.35b Triceps starting position

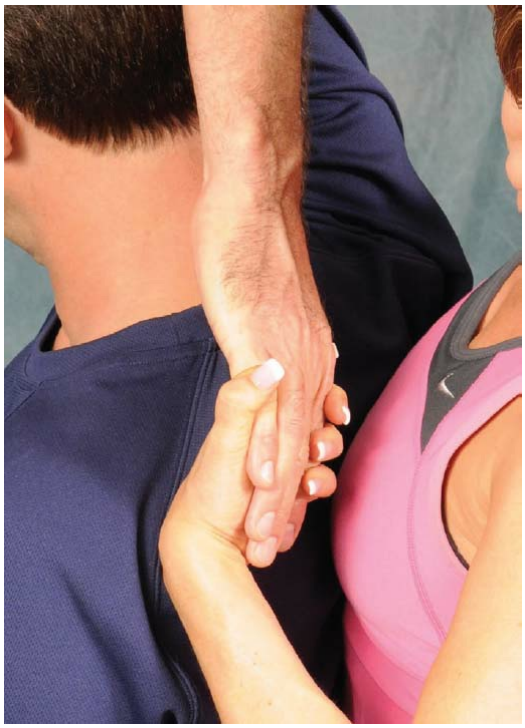

Figure 6.35c Close up – hand position

Sitting triceps

Goal: To target tissues lying within the DBAL: triceps.

To increase flexion of the elbow, long head of triceps, flexion of the humerus.

Client position: The same as the previous position.

Therapist: From the last position.

- To focus on the long head of the triceps proximal fibers, change your hands and place the one that was on their elbow in the front of their shoulder and the one that was on their wrist, on their elbow.
- Lift arm upward with gentle traction and assist the client to bend their elbow behind their back.
- Then change your hands for the next position with one hand on the back of their elbow and the other on their fingertips.
- While stretching, lift their elbow upward and back into flexion.
- Pull their fingertips down their back.
- While stretching gently pull their hand down their back and press shoulder deeper into extension.

ROM: Flexion of the elbow, long head of triceps flexion of the humerus.

Traction: Think of lifting their elbow up towards the ceiling, then back towards you and finally pulling their arm down their back through the fingertips.

PNF: Get the client to push their elbow forward into your hand and try to extend their hand upward.

Cue for PNF: "Push your elbow forward into my hand." and "Try to extend your hand to the ceiling."

Stretch: Increase flexion of the elbow, long head flexion of the humerus. Play with the angles to target more fibers.

Repeat: Two or more times.

7. Levator scapulae release: neck rotation, side flexion same side – levator scapula – DBAL

Figure 6.35d Levator release

Neck and shoulder release

Goal: To target tissues lying within the DBAL: levator scapulae. Because this area has been in a contracted state for some time from previous sequences, it is quite nice to release it with this last stretch to finish the sitting series.

Therapist:

- Release the client's arm from the stretch position from the previous move, in the triceps stretch.
- Assist their head down into forward flexion and around to opposite shoulder.
- Place one hand on their shoulder and the other on the side of the head.
- Gently press downward with both hands.
- Stretch them away from each other.
- Take several breaths to give the tissue time to release.
- Move their head back down through forward flexion and lift it upwards to finish.
- It is important to remember to always move through neutral when returning from a stretch. This is so the tissue that has just been lengthened will not re-contract.

Repeat: 4–6 on the other side.

F. Floor Stretches

1. Pec major on ball: shoulder abduction, elbow flexion – pec major – SFAL, FL

Figure 6.36a Pec major on ball – starting position

Figure 6.36b Therapist kneels down

Figure 6.36c Therapist leans forward

Goal: To target tissues lying within the SFAL, FL: all the fibers in the anterior chest and shoulder, pec major.
To increase shoulder abduction, horizontal abduction and lateral rotation of the humerus and back extension.
Client position: Lies supine, arched over a ball with their feet hip distance apart, feet flat on the floor. Fingers are interlaced behind their head.
Therapist:
- Stand behind the client in a lunge position and lean forward.
- Place your hands on their elbows.
- Gently open their elbows down towards the floor.
- Drop your body down onto your back knee.
- Lean forwards to increase the stretch.
- To further increase the stretch and target more pec fibers, slowly roll the ball towards their feet.

ROM: Shoulder abduction, horizontal abduction and lateral rotation of the humerus and back extension.
Traction: Think of opening their shoulders away from their torso and down to the floor.
PNF: Get the client to press their elbows towards the ceiling.
Cue for PNF: "Pull your elbows together."
Stretch: Increase shoulder abduction, horizontal abduction and lateral rotation of the humerus and back extension.

Repeat: PNF two or more times. Play with the angles to target more fibers.

2. Pec minor on ball: shoulder abduction, elbow flexion (90°/90°) – pec minor – DFAL

SIGNATURE MOVE

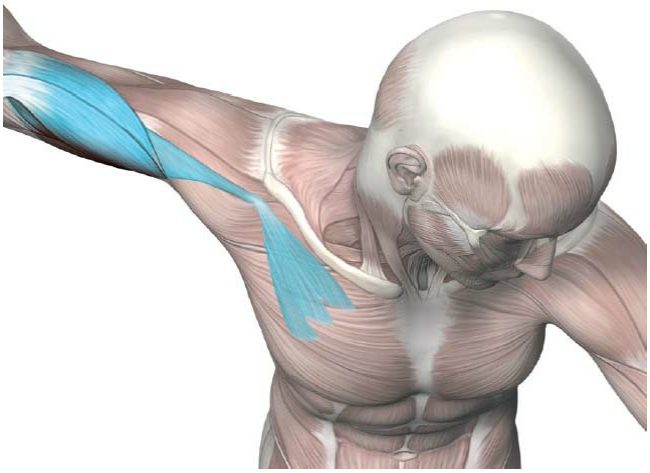

Figure 6.37a Target tissues primarily within the Deep Front Arm Line

Figure 6.37b Pec minor on ball – starting position

Figure 6.37c Hand position

Figure 6.37d PNF

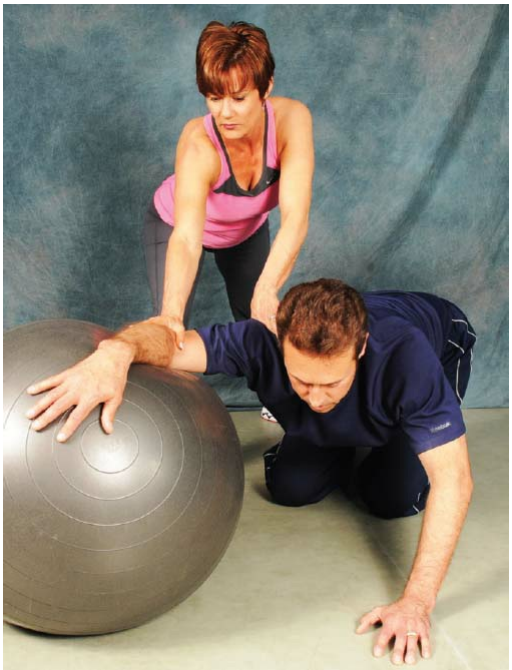

Figure 6.37e Traction

Goal: To target tissues lying within the DFAL: all the fibers deep in the chest, pec minor.

To open all three angles and slips of the pec minor.

To increase retraction of the scapula.

Client position:

- Kneeling with their knees hip distance apart and one arm placed on a ball, elbow bent at a 90° angle. The ball should be about the same height as they are when on

all fours.

- Place their other hand on the floor directly underneath their shoulder.
- Get them to rotate their torso slowly and gently down toward their hand on the floor.

Therapist:

- Stand either behind or in front of the client – whichever feels best for you.
- Place one of your hands on the lateral border of their scapula on the joint line.
- Angle your hand in slightly towards the scapula and gently downwards.
- Place your other hand on the lateral aspect of their elbow and either press it down into the ball or pull it away, but in either case, traction elbow away from shoulder joint .
- Your resistance remains steady – focus on the traction of their arm moving away from their body.
- To increase fibers, roll the ball slightly forward.
- Slowly and gently increase the stretch of their shoulder downward by pressing on scapula.
- Lean away with your body to create traction.

ROM: Retraction of the scapula, drop torso below ball and rotate away from arm on ball.

Traction: Think of creating space between the scapula and their elbow. Traction them away from each other.

PNF:

- Get the client to lift their body up into your hands against your resistance.
- Get the client to sit back onto both of their hips evenly.
- Get the client to sit back onto the opposite hip from the arm on the ball.

PNF cue:

- "Lift your body up into my hand."
- "Sit back into your hips."
- "Sit back into your opposite hip."

Stretch: Increase retraction of the scapula.

Repeat: PNF two or more times. Play with the angles to target more fibers.

Repeat on the other side.

G. Standing Stretch

SIGNATURE MOVE

1. Standing rhomboids: trunk rotation, shoulder protraction/flexion – rhomboids – DBAL, SPL

Figure 6.38a Rhomboids – hand placement

Figure 6.38b ROM

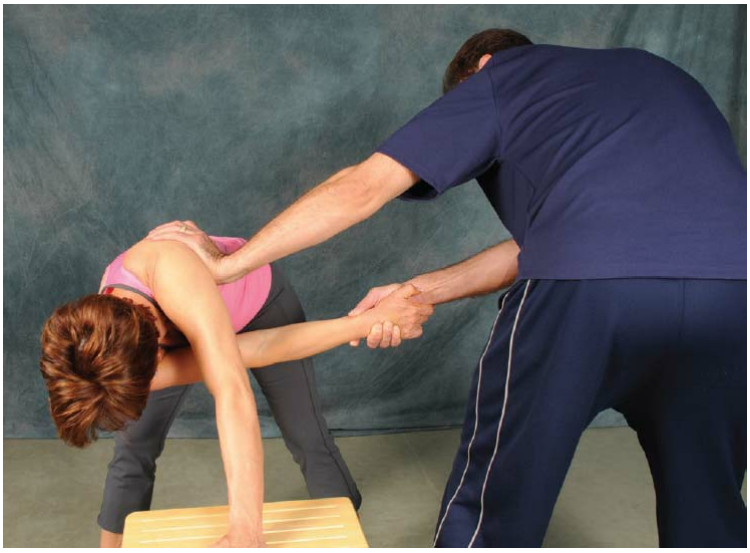

Figure 6.38c PNF

Figure 6.38d Stretch

Goal: Target tissues lying within the DBAL, SPL: rhomboids.

Client position:

- Get the client to bend at the waist and hold onto a solid object such as the table.
- Have them stand with their feet hip width apart, knees bent throughout stretch.
- Weight should be evenly distributed over both feet. Watch that they don't shift their weight onto one leg.
- With the arm that is furthest away from you, they reach through and grasp your forearm above the wrist.

Therapist:

- Turn and face the opposite direction to your client.
- Stand with your feet hip width apart and bend your knees.
- Bend at the waist.
- Place one hand on the underside of their lat and the other grasps their wrist – interlock your wrists for a solid contact.
- Rotate their lat upward towards the ceiling as you pull their arm across their body, rotating their body toward you. The focus is on rotating the torso, not pulling the arm across.

ROM: Trunk rotation.

Traction: Think of rotating their torso away from their arm.

PNF: Get the client to pull their arm and shoulder back across themselves and rotate away from you.

Cue for PNF: "Pull your torso and arm away from me."

Stretch: Increase trunk rotation.

Repeat: PNF two or more times. Play with the angles to target more fibers.

Acronym Glossary

ADLs	Activities of Daily Living
AROM	Active Range of Motion
CRAC	Contract Relax Agonist Contract
DBAL	Deep Back Arm Line
DFAL	Deep Front Arm Line
DFL	Deep Front Line
DOMS	Delayed Onset Muscle Soreness
FL	Functional Line
GTO	Golgi Tendon Organ
H-R	Hold-Relax
HVLA	High Velocity Low Amplitude
IR	Internal Rotation
LL	Lateral Line
LLD	Leg Length Discrepancy
LSS	Lengthen-Shorten-Stabilize
MET	Muscle Energy Technique
PMJN	Posture-Myofascia-Joint-Nerve
PNF	Proprioceptive Neuromuscular Facilitation
PNS	Parasympathetic Nervous System
PROM	Passive Range of Motion
PTSD	Post Traumatic Stress Disorder
PRT	Positional Release Technique
R1	Resistance 1
R2	Resistance 2
RROM	Resisted Range of Motion
RT	Resistance to Traction
SITTT	Scan-Identify-Treat-Test-Treat again
SBAL	Superficial Back Arm Line
SBL	Superficial Back Line
SFAL	Superficial Front Arm Line
SFL	Superficial Front Line
SIJ	Sacro Iliac Joint
SPL	Spiral Line
SLR	Straight Leg Raise
SNS	Sympathetic Nervous System
SOAP	Subjective Objective Assessment Plan
TOC	Traction Oscillation Circumduction

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