

# FMT PERFORMANCE<sup>TM</sup>

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**ROCKTAPE**  
Go stronger, longer

PARTICIPANT NAME: \_\_\_\_\_



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## INTRODUCTION

Welcome to the Functional Movement Techniques (FMT) Performance training course! RockTape is excited to bring this course to you and we're confident that it is the best training available of its kind!

This Study Guide is intended to condense the concepts introduced to you in the Performance course and serve as a companion to the information given by your instructor during your training. It also compiles the research studies that are the foundation of FMT and allows you space for notes, thoughts and questions. The practical portion of the guide gives basic instructions for the Performance movement-based taping applications. For a more comprehensive print resource you should reference the latest edition of RockTape's Power Taping Manual as well as the many complimentary videos of taping applications available on RockTape's website (<http://www.rocktape.com>). Because FMT courses are open to many types of practitioners, this guide uses terms such as "clinician," "practitioner" and "manual therapist," as well as "patient" and "client" interchangeably so as to be inclusive of our entire audience.

If you are reading this Performance Study Guide that means you have already completed your Basic training course. FMT's Performance course builds on everything introduced in Basic adds a new dimension of fascial plane taping and movement assessment that is unique to the FMT model. Remember that all of the frameworks introduced in Basic are can be mixed and matched as needed and that carries over to Performance as well. Performance taping expands on the concepts already introduced to you and the emphasis of Performance taping is performance.

Performance taping looks at the body from the fascial anatomy perspective and uses movement assessment to determine where functional improvements can be made and which fascial slings need RockTape support. The same movement tests are used as a retest after the taping. Sport-specific taping frameworks will also be explored in Performance training.



## SECTION 1 MOVEMENT

# ROCKTAPE MOVEMENT PYRAMID

**CORRECTIVE EXERCISE** – Used to normalize human movement before increasing training or exercise demands.

**ROCKTAPE** – A special kinesiology/sports tape that provides support while allowing full range of motion. Tape is used to decrease pain, unload tissue via decompression, and provide a novel stimulus that improves body awareness.

**IASTM** – Instrument-Assisted Soft Tissue Massage – A manual therapy technique designed to provide direct, mechanical manipulation of irregular tissue.

**ROLLING/BALLS/BANDS** – A collection of tools used by athletes for manipulation of the myofascial system to normalize muscle tone.

**ASSESSMENT** – The act of making a judgment about the quality of human movement.

**SCREENING** – The act of examining people to decide if they are suitable for a particular movement or exercise.

The human body is meant to move. At least one study has even related the inability to do certain movements with a higher mortality rate.<sup>1</sup> Many of the problems encountered by the manual therapist are related to movement in some regard, whether it is too little as in the case of a sedentary patient or it is improper movement, as is the case for so many people. Movement problems can be extremely apparent or very difficult to spot. As fatigue, intensity and load become part of the equation, movement problems tend to reveal themselves in more obvious and spectacular ways. The human body is also adept at compensating for movement problem. It can be difficult to determine what part of a movement is normal, what part is a compensation and where the actual source of the dysfunction is.

In the FMT Basic Study Guide we explored the concept of the joint by joint approach popularized by Gray Cook and Mike Boyle. This is at the heart of the FMT Performance approach. It is also important to understand that all movements include starting and finishing positions, so the postural and positional considerations from FMT Basic are also important in the context of how the body initiates and finishes motion relative to the positions it starts and stops in.

When considering movement, keep in mind that there are two fundamental questions to ask. First, does the person's body actually have the capacity to do the movement in the first place? In other words, do they have the range of motion and soft tissue extensibility to allow a movement? Secondly, does the person have adequate neurological control governing the movement? Hopefully in your FMT Basic course your instructor showed a short video of a seminar attendee who had a dramatic increase in shoulder abduction immediately following a basic shoulder taping application. How is this possible? If the patient had a torn labrum, hypertonic muscles or ligaments limiting his range of motion or some other structural problem, how likely is it that a few strips of RockTape would give him twice the range of motion he had just seconds before? Or, is it more likely that this person's gradual chronic pain had caused the brain to establish new movement patterns and essentially lose proper control of the shoulder's movements? Could the stimulation provided by RockTape over the shoulder create enough change in the afferent and efferent communication that the shoulder is able to move better because there is more awareness and control of it? These are questions you will repeatedly ask yourself throughout the FMT Performance course as well as when you start to see amazing things happening in your practice with the application of RockTape to clients with movement dysfunctions.

The key to dealing with movement is to be excellent at movement screening. The FMT Performance frameworks are very simple and straightforward to apply. The far greater challenge in movement taping is being able to see the movement dysfunction first so that you know which fascial plane to support. Applying the tape is the easy part in FMT Performance. Movement guru Gray Cook has been credited with saying, "To get good at seeing movement you have to watch a lot of movement." This is a deceptively simple concept and it is certainly true. The more movement you watch, the more you will notice. You essentially "calibrate" yourself to see the obvious things first, but the more you watch people move the more you will see the more subtle problems, and your skill level will only improve the more you practice.

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1 de Brito LB et al. Ability to sit and rise from the floor as a predictor of all-cause mortality. *European Journal of Preventive Cardiology*. 2012. Dec 13 [Epub ahead of print]

There are many excellent approaches to movement screening and assessments. The Functional Movement Screen (FMS) and Selective Functional Movement Assessment (SFMA) are two of the most well known formal approaches to movement assessment and certainly the FMT approach works excellent in the context of those systems.

Unfortunately these methods can also be time-consuming and in some cases difficult to scale for patients who are extremely limited in their ability to move. The movement assessments taught in FMT Performance are simple, quick to perform and are scalable for just about any client. While you may not be able to do a full squat test on a 95-year-old patient, can you watch them sit and rise from a chair and get most of the same information? The world of movement is a gigantic, continually developing science and there are so many great resources available to the new, as well as advanced, learner that this FMT course is simply the beginning of a lifelong journey in movement.

Finally, the most important thing to understand about movement assessment is that there are a handful of basic, fundamental human movements from which all others build. Your client may not be an Olympic weightlifter, but can the overhead squat test give insight into various mobility and stability elements of their body? Does it translate to sitting and standing activity that, when done incorrectly over thousands of cycles may lead to problems of pain or injury? Your patient may not spend a lot of time rolling around on the floor, but can the failure of the rolling tests translate to a fundamental inability to control the core properly in other movements? The purpose of the movement tests used in FMT Performance are to gain insight into other movements that build from these fundamentals as well as to have a test-retest scenario to determine what to do and whether what you are doing is effective.

RockTape is able to affect movement in two ways. There is certainly a mechanical effect from the tape's stretch and recoil properties in that they create a shearing effect in the skin that can affect movement.<sup>2 3</sup> To a greater extent, however, it is the neurological effect of tape on skin that has the greatest impact on how the body moves. The skin and fascial system are loaded with sensory receptors that relay pressure, all types of touch and positional information back to the brain. The brain then responds to this information to maintain or correct positions and motions. Research suggests that there is a beneficial stimulatory effect to these receptors when skin is taped and that the brain responds with improved movement patterns to areas that have been taped.

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2 Edin BB and Johansson N. Skin strain patterns provide kinaesthetic information to the human central nervous system. *Journal of Physiology*. 1995 487(1):243-251.

3 Edin BB. Cutaneous afferents provide information about knee joint movements in humans. *Journal of Physiology*. 2001; 531(1):289-297.



An interesting study by Thedon<sup>4</sup> showed that a small strip of tape over the Achilles' tendons of subjects was enough stimulation to improve quiet posture. Most interestingly, the tape had no effect on the stability of the subjects' posture until they experienced fatigue. The authors concluded that "When the muscular sensory input flow normally relevant for the postural system is impaired due to fatigue, the weight of cutaneous information increases for the successful representation of movements in space to adjust postural control." In other words, muscle fatigue may compromise the proprioceptive information from the muscles that is needed for movement, making the information coming from the skin more important as more fatigue is experienced. This is very important in the context of athletics as stimulation of the skin through taping can potentially have an improved effect on movement, possibly enhancing performance as well as recovery and injury prevention.

A "negative" study<sup>5</sup> that is sometimes cited by critics of kinesiology taping actually supports the information from Thedon's study mentioned above. This study showed that there was no difference in "reproduction of joint position sense" at the ankle in healthy subjects who were taped versus those who were not taped.

Some would say that this "proves" that kinesiology tape does not affect the body's positional sense, however in light of Thedon's study this is not a surprising outcome. It would be interesting to reproduce this study on fatigued subjects. Zanella's study<sup>6</sup> on the use of tape to reposition the scapula is similar to Halseth's. It, too, showed no change in the position of the scapula whether the subjects were taped or not. This could be interpreted as a "negative" study, however one would expect that movement changes with skin stimulation would be minimal in subjects who are not fatigued. Furthermore, this study supports one of Fascial Movement Taping's core concepts, that RockTape does not pull or push joints, bones and muscles into certain positions, but rather that it has a primarily neurological effect. In a study by FMT instructor Daniel Lent-Koop, MPT, CHT that has not been published as of this writing, taping of the performance front chain (explored in detail in the FMT Performance course) had a significant effect on the performance of the Star Excursion Balance Test on subjects who generated fatigue after a very hard 2-mile run. Another unpublished study by occupational therapist Ian Goh found "enhanced force output and endurance in the lower limbs of soccer players during game time scenarios" and concluded that RockTape used during soccer matches enhanced performance and could prevent injuries.

In the context of movement, additional studies have shown kinesiology tape to have beneficial outcomes on Functional Movement Screen scores<sup>7</sup> as well as improvements in shoulder kinematics in baseball players with impingement syndrome.<sup>8</sup> While this latter study seems to contradict Zanella's on scapular positioning, perhaps as with fatigue states that proprioceptive information from the skin is weighted more heavily in injured subjects, too. What is clearly evident in the available literature on kinesiology taping and movement is that there is support for using RockTape to affect movement and that this area of investigation is new and deserves much more attention.

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4 Thedon T et al. Degraded postural performance after muscle fatigue can be compensated by skin stimulation. *Gait & Posture*. 2011; 33:686-689.

5 Halseth T et al. The effects of Kinesio taping on proprioception at the ankle. *Journal of Sports Science and Medicine*. 2004; 3:1-7.

6 Zanella PW et al. The effect of scapular taping on shoulder joint repositioning. *Journal of Sport Rehabilitation*. 2001; 10:113-123.

7 An HM et al. The effects of kinesio tape on lower extremity functional movement screen scores. *International Journal of Exercise Science*. 2012; 5(3):196-204.

8 Hsu YH et al. The effects of taping on scapular kinematics and muscle performance in baseball players with shoulder impingement syndrome. *Journal of Electromyography and Kinesiology*. 2009; 19:1092-1099.

## NOTES



## **SECTION 2**

# **FASCIAL ANATOMY**

As you would expect from the name, both movement and the fascial anatomy model drive FMT concepts and frameworks. For hundreds of years, the anatomy of human muscles has been taught from the perspective of isolated muscles and their origins and insertions on bones. To a very large extent, the underlying message to students of anatomy has been that muscles work largely in isolation, i.e. that there is a primary mover that may be aided a little by synergist muscles and opposed by antagonists. As such, many earlier taping approaches are based on outdated concepts, making them less effective as well as much more difficult and cumbersome to apply for the practitioner.



***Posterior Arm Chain***

The past 15 years has seen a significant renaissance in the concept of fascial anatomy. There is a new appreciation in the world of anatomy and manual therapy that embraces the fascial system, once thought to be merely a convenient packing material for the important muscles beneath. Fascia is, in fact, a highly important system in the body that transcends being a basic connective tissue. Its importance in movement cannot be overstated as the muscles connected by fascial tissue work in conjunction with one another rather than in isolation. It is now accepted that fascia is responsible for much of the force transmission that becomes movement in the musculoskeletal system.<sup>9 10 11 12</sup>



***Tensegrity icosahedron  
(intensiondesigns.com)***

Along with the fascial anatomy model comes an appreciation for how the concept of tensegrity (or “biotensegrity” when applied to the body) also influences the structure and function of the body. A term coined by Buckminster Fuller in the 1960’s,<sup>13</sup> tensegrity refers to a structural principle in which compression elements are contained within a network of continuous tension elements in a way that the compression members do not touch one another and the tension members dictate the structure of the overall unit.

In the human body, the concept of tensegrity, or biotensegrity, can be applied not only to the gross structure of the musculoskeletal system, but thanks to the research largely pioneered by medical doctor Donald

9 Schultz RL and Feitis R. The Endless Web. 1996. North Atlantic Books.

10 Lindsay M. FASCIA: Clinical Applications for Health and Human Performance. 2008. Cengage Learning

11 Myers TW. Anatomy Trains: Myofascial Meridians for Manual and Movement Therapists (2nd Ed). 2008. Churchill Livingstone.

12 Schliep R et al. Fascia: The Tensional Network of the Human Body. 2012. Churchill Livingstone.

13 Fuller RB. Tensegrity. Portfolio Art News Ann. 1961; 4:112-127.

Ingber, can also be scaled all the way down to the cellular level.<sup>14 15 16</sup> It is well worth the time and effort of the manual therapist to read osteopath Randel Swanson, Jr.'s excellent article on biotensegrity and its application to osteopathic practice.<sup>17</sup> The principles contained are easily applicable to the practice of all types of manual therapy.



*Skin ligaments (JC Guimburteau)*

From the perspective of Fascial Movement Taping, in addition to the stimulatory effect of the tape on the various sensory receptors in the skin, there are connections between the skin and the deeper layers of connective tissue and fascia. It is likely that the mechanical effects of taping the skin transfer to the deeper layers thanks to the skin ligaments as described by Guimburteau and other fascial anatomists like Gil Hedley, Ph.D.

In short, there are three aspects to the Fascial Movement Taping concepts explored in FMT Advanced training:

1. The brain coordinates muscle activity into movements.
2. Taping movement patterns helps to prime the sensorimotor system via cutaneous afferent stimulation.
3. Performance is improved via improved fascial continuity.

In *The Endless Web*, Schultz states:

“The muscle-bone concept presented in standard anatomical description gives a purely mechanical model of movement. It separates movement into discrete functions, failing to give a picture of the seamless integration seen in a living body. When one part moves, the body as a whole responds. Functionally, the only tissue that can mediate such responsiveness is the connective tissue...”

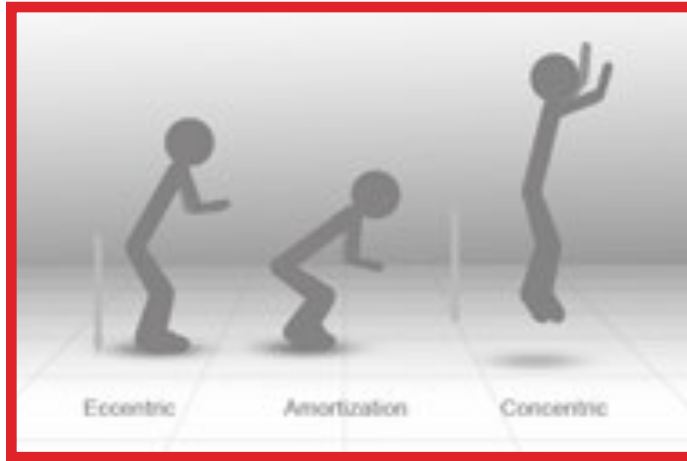
With fascial anatomy, biotensegrity, the neurological model of FMT and skin ligaments and other connective tissues in mind, consider the biomechanical lifting effect of RockTape as well as the shearing created by the stretch in the tape. In your FMT courses you are shown a video of diagnostic ultrasounds of the thigh in a taped and untaped state. Measureable separation of the deep and superficial fascial layers is apparent in the video. As you will see in the practical test-retest portion of the course, this unloading and the stimulation of the cutaneous receptors has a dramatic effect on movement.

14 Ingber DE. The architecture of life. Scientific American. 1998; 278(1):48-57.

15 Ingber DE. Tensegrity I: cell structure and hierarchical systems biology. Journal of Cell Science. 2003; 116(pt 7):1157-1173.

16 Ingber DE. Tensegrity II: how structural networks influence cellular information processing networks. Journal of Cell Science. 2003; 116(pt 8):1397-1408.

17 Swanson RL. Biotensegrity: a unifying theory of biological architecture with applications to osteopathic practice, education, and research – a review and analysis. Journal of the American Osteopathic Association. 2013; 113(1):34-52.



In some ways RockTape functions much like the myofascial system in its properties and how they relate to movement. The figure below shows the three phases of a basic movement like jumping. In the eccentric phase, there is pre-loading of the muscles and connective tissues. The second phase of the movement represents the amortization or storage of the energy generated in the eccentric phase. Finally the elastic energy is released in the concentric phase of the movement and the jump occurs.

*Pre-loading, storage and release of elastic energy*

Studies on the properties of RockTape performed at the University of Northumbria by Dr. Sue Stewart have shown that RockTape stretches 180% of its resting length. This also means that, like the myofascial system, there is storage of energy and release in the concentric phase, or what we refer to as the “snap back effect”. Adding tape to the skin is akin to adding a layer of muscle to it as the RockTape stretches with the eccentric loading, stores energy and then “snaps back” or recoils through the concentric phase, adding to the efficiency and energy of the motion.

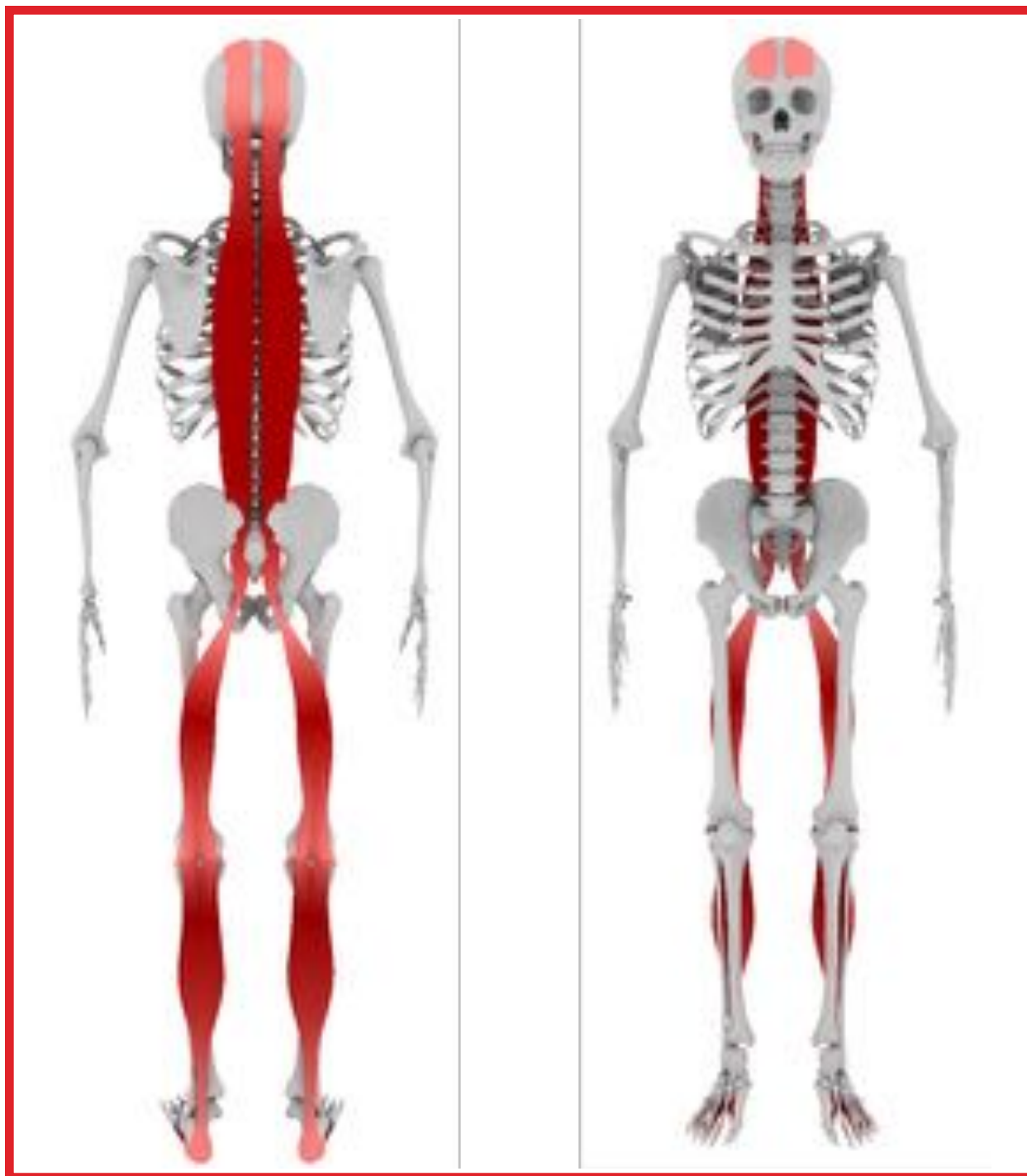
## NOTES



***Performance Back Chain***

From this integrated functional anatomy perspective, it is important to understand how muscles work in kinetic chains, slings and in sequence rather than as isolated units. And, rather than “taping muscles” we can use fascial anatomy to tape movements based on the impairments that are evident in the client’s movement assessment. In FMT Basic posture was looked at from a multiplanar perspective and movement should also be assessed in the sagittal, coronal and transverse planes. While each fascial plane will be investigated in depth in your FMT Performance course, below is an overview of the fascial anatomy that is assessed and taped in FMT Performance.

The first fascial plane is the Performance Back Chain, which has to do with sagittal plane movements and stability. The Performance back chain runs along the back of the body from the bottom of the feet and toes over the head to the front of the skull above the eyebrows. As with all of the fascial chains described in FMT Performance, this entire piece of connective tissue can be dissected as one large piece of fascia, linking muscles, ligaments, tendons and even bone from end of the body to the other.



*Performance Back Chain*



Another sagittal plane fascial chain is the Performance Front Chain, which acts as an antagonist/balance to the Performance Back Chain. The Performance Front Chain includes the foot and toe extensors, patella, rectus femoris, rectus abdominis, sternochondral fascia, sternocleidomastoid muscles and the connective tissue of the scalp.



***Performance Front Chain***

The next fascial plane is the Performance Lateral Chain, which moves and stabilizes in the coronal or lateral plane.



*Performance Lateral Chain*



***Performance Lateral Chain***

The Performance Functional Chain is involved in cross-body and rotational movements, including locomotion, as well as transverse plane stability. There are both back and front functional chains.



*Performance Functional Chain*

The deep muscles of the trunk, spine and legs create the Performance Core Chain. It is important in core activation and stabilization, breathing and foot mechanics.



*Performance Core Chain*

The Performance Back Arm Chain and the Performance Front Arm Chain connect the upper extremities to the trunk, scapula and the opposite arm.



*Performance Back Arm Chain*



*Performance Front Arm Chain*

The final fascial planes in FMT Performance training are the Performance Spiral Chains. The spiral chains offer transverse plane control and encompass elements of the other performance chains.



***Performance Spiral Chains***

## NOTES





## **SECTION 3**

# **MOVEMENT SCREENING**

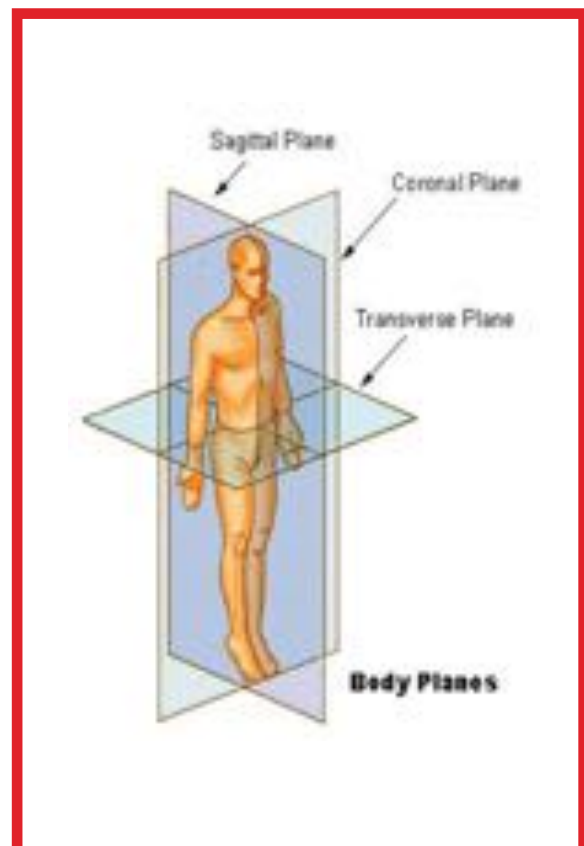
Movement screening is used in FMT to be able to objectively decide if taping is creating appropriate movement pattern changes. When taking a client's history, it is important to ask them about their performance history, too. Include areas of fatigue, perceived weakness, discomfort, cramping, balance loss and any other negative changes they may notice concerning sports, recreation or work activity and activities of daily living.

There are many formalized approaches to movement screening, all of which can be adapted to the FMT Performance fascial taping frameworks. FMT Performance training workshops use a variety of screens to determine which, if any, fascial chains would benefit from support with RockTape. If you have experience and training with a more formalized system of movement screening like the Selective Functional Movement Assessment, for example, you will find that the frameworks included in FMT Performance are simple to apply and you will have the same retest ability as with the standalone tests used in your FMT Performance course.

In most cases, people are subconsciously dysfunctional in some of their movement patterns. The movement is incorrect, yet the person does not know it. Movement screens help create conscious awareness of dysfunctional movements, but does nothing to correct those dysfunctions. It is one thing to know how to squat properly, for example, but it's another thing entirely to actually squat properly. FMT Performance frameworks use taping and advocate corrective exercises to help patients become consciously functional in the movement they previously had a problem with. Through correct repetition, the desired result at the end of the therapeutic cycle is that the person will be able to perform the movement functionally and subconsciously without taping support. Once the movement is corrected, then the client can go about working on other factors like strength, endurance, coordination and higher skill level.

As with the postural assessment from FMT Basic, all movement needs to be assessed from multiple planes. Most natural human movements are triplanar, meaning they are occurring in three planes at one time. As such, all three planes of the body need to be considered for every movement being assessed. A squat may look fantastic from the side but horrible from the front. A push-up could be perfect from the side but when viewed from head-to-foot could be plagued with rotational problems. Each movement should be assessed from the side to look for sagittal plane problems, from the front and/or back to look for coronal plane problems and whenever possible from the top down to see transverse/rotational plane problems. As with static assessment, the transverse plane is often the most difficult to assess, but it is no less important particularly in rotation activities and sports.

As was the case for postural assessment, technology can be extremely helpful in movement assessment. Use of motion capture technology serves many advantages over simply watching a movement and taking notes on it in a patient's chart, for example.



Even the most basic motion capture applications have features that allow you to speed up, slow down or isolate the video for closer assessment. Many allow you to take measurements of angles and arcs or to circle or highlight important areas of the movement. Because most patients are visual and/or kinesthetic learners, being able to see themselves perform a movement has a much bigger impact than simply telling the patient what you are seeing while you assess them. These tools also allow you to save their videos and compare them for changes as the patient progresses in their treatment plan. There are numerous motion assessment applications available for little to no cost on smart phones or tablet devices, including PostureScreen (which also does static postural analysis), UberSense, Coach's Eye and many others.

There are six basic movement tests used in FMT Performance for assessment. Your instructor may use other tests in addition to these, and as stated earlier, there are many other approaches to movement screens can be used. Keep in mind that all movements can be scaled appropriately for the patient and that you do not need to perform all of these tests on every patient at every appointment. Simply pick and choose the ones you want to perform and scale them appropriately. For example, you would not necessarily ask a 90-year-old patient to do a deep overhead squat, but you could scale the test by having her sit down and get up from a chair. If a patient cannot do a push up, you could scale it by having them stand and push against a wall, or do the push up with an inclined position, for example, with their hands on a countertop. The basic movement assessments taught in the FMT Performance course are:

- Breathing
- Double Leg Stance Screen (Squat)
- Staggered Stance Screen (Lunge)
- Single Leg Screen
- Push Screen
- Scapular Screen (Diamond Test)
- Rolling Screen

To utilize these screens in your practice, simply pick one or more that you want to screen and have the patient perform the tests with minimal coaching and instruction. Assess the movements from all planes and, preferably, video each one. After determining if there is a faulty movement pattern and which fascial chain support would improve it the most, apply the FMT taping application and reassess the movement in the planes that the faults were found in (also videoing the movements with tape applied). Coaching, instruction and corrective exercises are now given, typically with home instructions for the patient to continue doing the correctives with proper form and while still taped for a period of days if possible. Reassess the movement at the next appointment and continue to tape and do corrective exercises as needed until the client has achieved conscious functional movement.

## PERFORMANCE CORE CHAIN

The Performance Core Chain includes deep muscles of the lower extremities, abdomen, spine, neck and jaw and is primarily involved with stabilizing the body in all positions and movements as well as respiration. Respiratory conditions, dysfunctional postural patterns, low back pain, knee pain, headaches and foot and ankle disorders (particularly overpronation of the feet) can all be attributed to a dysfunctional Performance Core Chain. The muscles and structures included in this myofascial chain are:

- Temporalis and masseter
- Scalenes and hyoid muscles
- Longus colli and capitus
- Diaphragm
- Transverse abdominis
- Iliacus and psoas
- Quadratus lumborum
- Pelvic floor muscles
- Adductors of the thighs
- Posterior tibialis
- Flexor hallucis longus and flexor digitorum longus

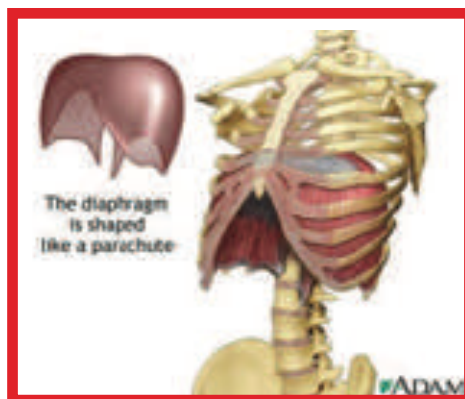
The Performance Core Chain functions to stabilize the pelvis and spine for all movements in all positions in addition to breathing. Coordinating breathing with strength movements such as Olympic weightlifting and power-lifting serves an important secondary purpose for the diaphragm as it helps create abdominal pressure that stabilizes the spine during these lifts. Virtually every movement and position that the human body is capable of requires coordination and stability of the Performance Core Chain.



Proper alignment of the ribcage and pelvis helps to normalize length and tension relationships between the pelvic floor and diaphragm. This is critical for optimal breathing as well as creating centration to allow for optimal core activation during movement. As such, posture, breathing and sequencing of core muscles are all integrated functions of the Performance Core Chain and need to be addressed by taping strategies.



*Abdominal expansion occurring before chest movement*

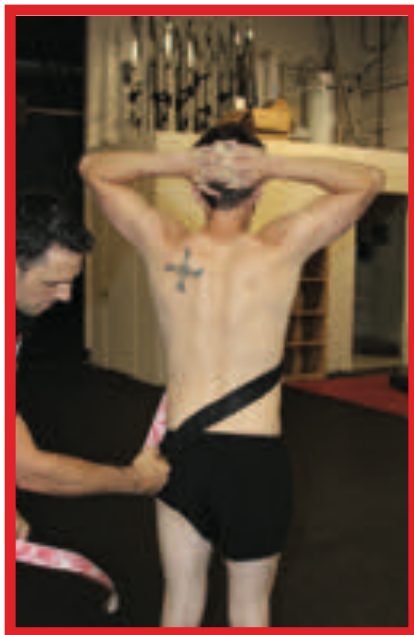
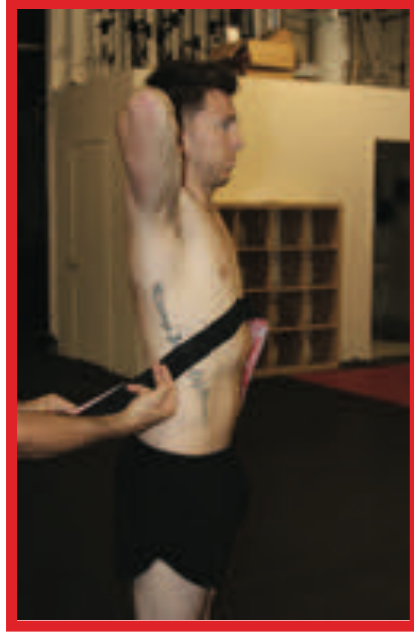


*Diaphragm and ribcage anatomy*



*Taping of the entire Performance Core Chain*

The entire Performance Core Chain may be taped with one long piece of RockTape, however a more common approach is to tape the diaphragm and transverse abdominal area in a spiral-like fashion to help give feedback to chest wall and abdominal expansion during breathing exercises. There are many strategies to “resetting” the diaphragm from traditional yoga breathing patterns and abdominal control movements to biofeedback methods or novel approaches like having patients inflate balloons while lying supine in a flexed hip position to activate the diaphragm.



To tape the diaphragm, measure a strip of RockTape from the xiphoid process of the sternum following the lower edge of the ribs and costal cartilage, around the lateral abdomen and across the lumbodorsal fascia to the opposite hip area, then double the length. Find the center of the strip of tape and apply it to the xiphoid process area, with the patient's arms upraised, and as they rotate their body apply the tape with no additional stretch following the pattern described above. Repeat on the other side.

## DOUBLE LEG SCREEN (SQUAT)

The squat screen is a measure of full body stability and mobility and there is a lot of information that can be garnered from it. It is very common to see movement faults in all three planes with the squat test, so it needs to be assessed carefully from the front, back, each side and the top. With each movement assessment it is important to not coach the movement. Simply give the patient the basic instructions for each assessment performed. Coaching, critiquing and instructing can all come later during the corrective phase. The instructions for the squat test are as follows:

- Client should be barefooted, or at least out of shoes, sandals, etc.
- Feet shoulder-width apart
- Feet in the sagittal plane (up to 15° of external rotation is within normal limits for normal foot alignment, but more than that represents a problem with the movement)
- Extend arms overhead in full shoulder flexion and with elbows locked out (use a dowel rod or barbell when available)
- Descend slowly into the deepest possible squat position keeping the heels on the floor, head and chest facing forward and the arms extended. Repeat 3-5 repetitions of the movement for each plane evaluated.

Evaluate the feet, ankles, knees, lumbopelvic hip complex, scapulothoracic joint, cervical spine and upper extremity during this test. The overhead component can add a lot of difficulty to the test, as can the depth of the movement. Options for scaling this test back include allowing the client to put their arms out in front of them rather than overhead (i.e. for patients with shoulder problems), less depth or even sitting down into a chair and then standing back up, etc.



An overhead squat poses significant challenges to the mobility and stability of many areas of the body, so a lot can go wrong when assessing this test. Some of the highlights and key errors that you may notice on this test are as follows:

- **Ankle dorsiflexion fault** – may indicate loss of joint mobility and/or tight gastrocnemius/soleus posterior chain of the leg
  - o Heels raise from the floor
  - o Weight shifts to balls of feet as squat gets lower
  - o Calcaneus everts and/or ball of foot swivels to allow the heels to deviate medially giving the patient a toed-out position as depth increases
- **Knee fault** – may indicate lack of anterior chain/posterior chain balance of muscle strength, knee flexibility problems or be due to foot and/or hip faults
  - o Calf contact with hamstrings (over-flexion of the knees)
  - o Medial deviation (internal rotation)/valgus of the knees during any part of the movement
  - o Knees tracking significantly anterior of the toes
- **Hip fault** – may indicate hip flexion/joint mobility problems and/or a lack of motor control of the hips and an inability to maintain torque in the joints
  - o Pelvis rotates posteriorly toward the bottom position of the squat (referred to as “butt wink” in most training circles) causes lumbar flexion. May indicate a functional gluteal weakness as well as tightness in the gluteus maximus an/or adductor magnus
  - o Thighs contact abdomen (take into account patient’s body type, size of abdomen, etc)
- **Thoracic spine and ribcage fault** – mostly relate to lack of thoracic mobility into extension and/or transverse plane (rotational) dissociation with the pelvis (indicating a lack of core organization and control)
  - o May contribute to the abdomen or even chest touching the thighs at the bottom position of the squat
  - o Can force the knees forward in the bottom of the squat
  - o Bar may drift forward or show up as a lack of shoulder flexion
- **Scapula fault** – mostly relate to scapular control issues that can be caused by shoulder and/or thoracic mobility problems
  - o Bar drifts forward
  - o Scapular winging
  - o Protraction of the scapulae and rolling of the shoulders
- **Shoulder (glenohumeral) fault** – mostly relate to range of motion deficits in flexion as well as an inability to maintain torque in the joint throughout the movement
  - o Inability to fully flex shoulders to maintain the bar over the feet or in slight hyperflexion keeping the arms fully vertical



*Starting position for the squat screen*



*Finishing position for the squat screen*



***Knee internal rotation fault***



***Unilateral knee fault and thoracic rotation***



***Thoracic extension and hip mobility fault***

In terms of our FMT taping applications, start thinking of these movements in terms of which plane the fault is occurring in and which fascial chain may be involved. For example, the knees deviating medially during the squat test are a frontal plane fault and likely involve the Performance Lateral Chain. Sagittal plane faults like failure of the thoracic spine to extend during this test involve the Performance Back Chain.

## NOTES

## STAGGERED STANCE SCREEN (LUNGE TEST)

The staggered stance screen requires greater lateral stability and balance than the double leg screen previously described. The lunge position features a narrow base and it is primarily a test of the lower half of the body, but could reveal core instability, too. The staggered stance screen is performed as follows:

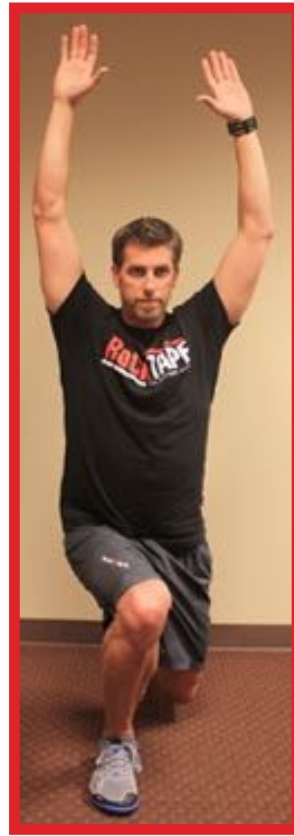
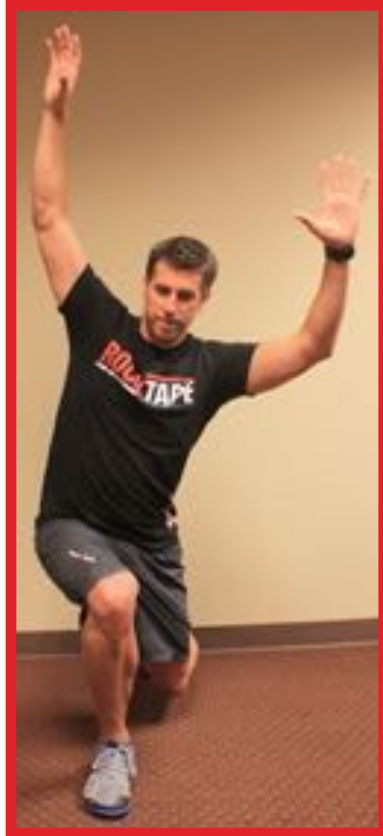
- Raise arms straight above the head or place hands on your waist
- Lunge forward with one leg, landing on the heel first.
- Lower the body by flexing the knee and hip of the forward leg until the knee of the trailing leg almost contacts the floor.
- Return to the starting position by forcibly extending the hip and knee of the forward leg. Repeat several times on each leg.



*Finishing position of the staggered stance screen*

Assess the patient's performance of this test from the front and sides, again looking for faults in all three body planes. While this is primarily a test of the lower half of the body, don't neglect to observe shoulders, neck and upper extremities in addition to the lumbopelvic hip complex, knees, ankles and feet. Key points of this test are that the lumbar spine movement is minimal, there is complete extension of the trailing leg hip in the finishing position of the test, the trailing knee almost touches the floor, knees and feet stay in alignment and balance is maintained throughout the movement. Errors in the staggered stance screen include:

- **Forward leg**
  - o Hip flexion fault – prevents the trailing knee from lowering just above the floor
    - May indicate tight adductor magnus.
    - Frequently a sign of weak hip extensors (adductor magnus and gluteus maximus).
  - o Ankle dorsiflexion fault – results in a short lunge (both knees should be close to 90° in the finishing position of this test)
    - Front heel may rise off the floor in the finishing position, indicating a joint mobility problem of the ankle mortise and/or gastrocnemius and soleus inflexibility.
- **Trailing leg**
  - o Hip extension fault – hip of the trailing leg does not completely extend in the finishing position of the test may indicate rectus femoris/anterior chain inflexibility (including the hip capsule itself as well as the iliopsoas muscle)
- **Dynamic stability and balance**
  - o Hip abduction fault – sudden drop of the hip on the forward leg side while stepping indicates weakness in the gluteus medius and minimus.
  - o Balance fault – any aspect of this test may fail due to balance problems and an inability to maintain stability throughout the movement.



*Frontal plane deviations including knee valgus and trunk instability*

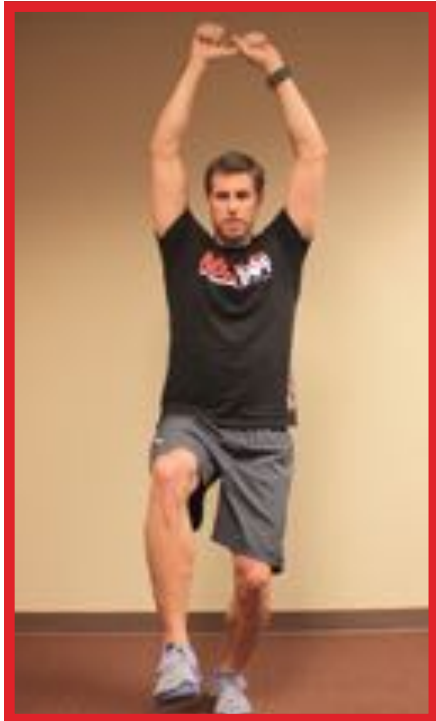


*Sagittal plane dysfunction - forward trunk lean*

As with the squat test, consider the motion in terms of the planes of involved in the movement as well as the fascial chains that could be supported when planar dysfunctions are noted. In the photos above the valgus forward knee and the lateral trunk flexion are frontal plane faults and involve the Performance Lateral Chain while the forward lean of the trunk is a sagittal plane dysfunction involving the Performance Back Chain. Although not pictured, trunk rotation may be seen during this test, indicating a need for Performance Core Chain and/or Performance Functional Chain support to stabilize the transverse plane.

## SINGLE LEG SCREEN

The Single Leg Screen or single leg squat test utilizes an even smaller base of support, thus demanding even more stability, than the staggered stance assessment. It is essentially a dynamic Trendelenburg test measuring the strength of the hip abductors throughout a range of motion. Assess the same checkpoints as the double leg squat test, again from the front and sides as well as observing the transverse plane for rotational dysfunctions. This test is performed with the arms extended forward or vertically above the body. Depending on their fitness, clients may be able to perform a full-depth one-legged squat (pistol) movement, although a quarter- to half-squat is more realistic in most cases.



### Perform the Single Leg Screen the following way:

- Stand on one leg while lifting the other leg forward off the ground and into approximately 45° of hip flexion.
- Arms may be held straight out in front or overhead.
- Lower into a squat position. The depth of the squat will vary between individuals and if a form fault is noted early in the movement, there is no reason to push for further depth. Aim for approximately 60° of hip flexion in the supporting leg.

There are many possibilities that indicate a failure of the Single Leg Screen, including all of the faults outlines for the Double Leg Screen and Staggered Stance Screen. Common faults include:

- **Knee stability fault** – most commonly the knee will internally rotate and go into a valgus posture. This is usually not an inherent knee problem, but rather may point toward lack of dorsiflexion in the ankle and/or hip muscular control problems.
- **Hip faults**
  - o The pelvis/hip may deviate laterally on the supporting leg side, which indicates weakness of the hip abductors and lateral chain (tensor fascia lata/iliotibial band, gluteus medius, gluteus minimus).
  - o The trunk may laterally flex over the hip of the supporting leg, which is a compensatory movement that also indicates weakness in the hip abductors as the lever arm between the hip and the center of gravity is shortened by this compensation and less effort needs to be exerted by the hip abductors to maintain balance.
- **Trunk faults**
  - o In addition to the above-mentioned compensations, when viewed from the side the lumbar spine and thoracic spine may go into flexion, indicating weakness of the erectors.
  - o Rotational transverse plane faults between the pelvis and ribcage are common, indicating a lack of core stability and organization.





*Combinations of valgus knee and trunk compensations*



*Lumbar and thoracic flexion faults*

## PUSH SCREEN

The Push Screen (Push Up) is a test that primarily evaluates timing and integration of the core as well as scapular stability. It is not a strength test and it should not be done with repeated fast repetitions as if during a workout. It is important to “reset” the client for each push up. Also note that the hand and arm position is done for reproducibility but is not the ideal position to do push ups for exercise in. When utilizing this test it is worth noting to the client that the testing position is done for a specific purpose and should not be used for doing push ups when exercising. Because of the testing position this is a good opportunity for the clinician to assess the patient for transverse plane errors, but as with each movement assessment they should be watched from the back and sides as well. The instructions for performing the Push Up Screen are as follows:

- Lie prone on the ground.
- Ankles, knees and thighs should be in the midline and touching (as opposed to a wide-legged stance).
- Place the hands on the ground at shoulder width apart. Men should have the thumbs level with their eyebrows while women may have their thumbs at chin level.
- Push up into a fully extended elbow position, holding the top position for a couple seconds, then fully lower back to the ground.
- Repeat several times to allow the clinician to observe from multiple perspectives and each repetition should start with the client's abdomen and chest fully in contact with the ground.



This is not an evaluation of strength, per se, as much as scapular and core stability. Some patients may not be able to perform the test due to upper body strength, in which case you may choose to have them do the test with the knees touching the ground, at an angle (against a table or bench, for example), or have them start in the elbows extended position and then lower eccentrically to the ground. Scale appropriately for the needs and abilities of each client. The common faults of the Push Screen include:

- **Sagittal plane faults**
  - o Hyperlordosis of the lumbar spine indicates core disorganization and possible gluteal and/or abdominal weakness.
- **Scapular faults**
  - o Scapulae may pull posteriorly from the ribcage bilaterally or unilaterally, indicating problems with scapular stability.
- **Trunk faults**
  - o Assess the patient from the front to look down the length of their body and watch for rotational movements in the trunk and lumbar spine or loss of transverse plane alignment between the ribcage and pelvis. All indicate core strength and/or control problems.



*Sagittal plane lumbar/abdominal fault*

## SCAPLAR SCREEN



*Bilateral scapular winging*



*Unilateral scapular winging (L)  
and trunk/pelvis rotation*

Scapular Screen (also called the Diamond Test – resource Joanne Elphinston) is useful to differentiate between some of the problems noted during the Push Up Screen. It is sometimes difficult to differentiate between scapular and trunk dysfunctions (and they may be both) in the Push Up Screen. The Diamond Test is a scapular stability test, so if the client fails this test it is an indicator of scapular stability and/or control problems. Perform the Diamond Test as follows:

- Lie prone on the ground with the thumbs and index fingers touching in the midline above the head as if creating a diamond shape. Hands, forearms and elbows should be contacting the floor.
- Examiner should take note of the client's scapular position.
- The client is then instructed to take note of the height of each arm's movement as well as scapular positioning throughout the test.
- Repeat several times and assess from several points of view.



Common problems found with the Scapular Screen include an inability to bring the hands and elbows back past the back of the head (general shoulder and scapular inflexibility) as well as asymmetry in the positioning of the arms, which indicate a unilateral scapular stability, movement and/or control problem.



*Right-sided scapular dysfunction fault*

## NOTES

## ROLLING SCREEN

Rolling movement patterns are the final movement screen used in the FMT Performance training courses. Rolling patterns require a fine eye and considerable practice to notice certain faults, but they are mostly an assessment of core integration, or sequencing, of core muscles. The ability to roll from the back to the front and vice versa develops in most infants between the ages of four to six months, although as with any milestone this may occur earlier or later in individuals.<sup>18</sup> As with many primal movement patterns, the ability to perform them properly can become diminished or altogether lost in adults and this loss of proper motor sequencing can be the cause of other dysfunctions and pain.

The rolling screen used in Fascial Movement Taping is described by Hoogenboom et al. in their 2009 paper that comprehensively describes the purpose, assessment, and several methods of correcting dysfunctional rolling patterns.<sup>19</sup> A more concise summary of rolling movement patterns can also be found in FMT instructor, Dr. Perry Nickelston's 2012 article from *Dynamic Chiropractic*.<sup>20</sup> Using this method, a total of eight rolling patterns are assessed, each one using just one limb to initiate the movement. The client's ability to roll from supine to prone using only the right arm to initiate the movement is assessed first. It is repeated using the left arm, right leg and left leg, too. Similarly, the ability to roll from prone to supine is tested using each limb to initiate the movement independently.

According to Hoogenboom, "When using rolling as an intervention, the upper extremity patterns make use of the fact that movements of the neck facilitate trunk motions or stated more simply, 'where the eyes, head, and neck go, the trunk will follow.'" As such rolling patterns assess the deep and superficial core of the trunk and muscle recruitment, coordination and function. The inability to roll is almost never related to muscle strength in generally healthy adults, but rather represents muscle sequencing and control problems. In general, rolling dysfunctions may be at the heart of low back pain or other spinal pain complaints and they certainly have a major impact on rotational sports involving throwing, batting, kicking, etc.

As stated, there are a total of eight rolling patterns to assess, four with the patient starting supine and four with the patient starting prone. To save time, you can assess these in a sequence that first checks a supine to prone pattern, then a prone to supine pattern and continue to alternate them back and forth. The examiner needs to look for sequential firing of muscles/segments that should create a "staircase-like" sequence of movements that result in rolling over. Watch for compensations in the movements, which are often subtle. For example, it is common to recruit a small push-off from one of the ankles when performing the supine upper extremity-initiated tests and it is often difficult to notice this, especially when your attention is on the upper half of the body and its muscle sequencing!

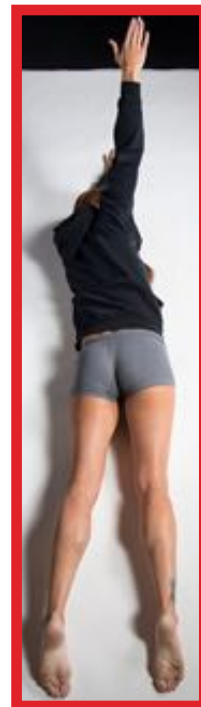
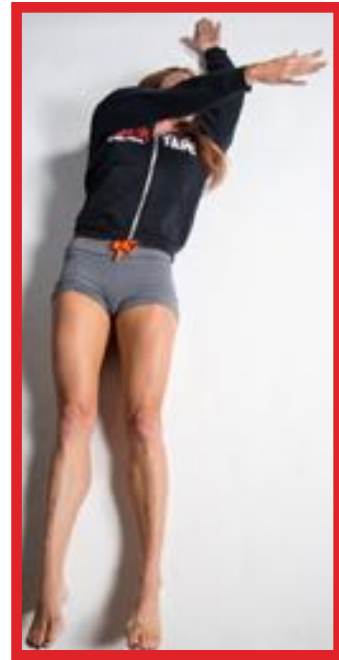
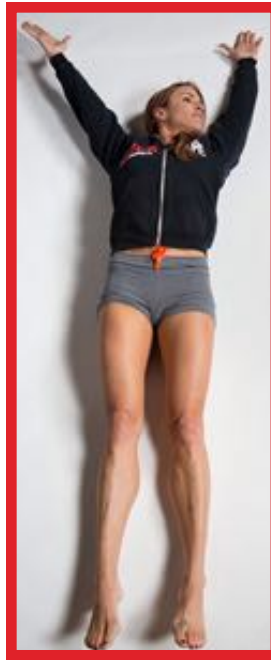
Try to give minimal coaching to the client as they perform the rolling patterns. Ask them to use just one arm or one leg and their head, neck and core to roll from back to front or front to back while not recruiting any of their other limbs in any way. The series of photos that follow show an arm-initiated rolling pattern from supine to prone and prone to supine.

18 "Infant Development: Milestones from 4 to 6 Months." Mayo Clinic. June 17, 2011. Accessed Dec. 22, 2013. <http://www.mayoclinic.com/health/infant-development/FL00099>.

19 Hoogenboom BJ et al. Using rolling to develop neuromuscular control and coordination of the core and extremities of athletes. *North American Journal of Sports Physical Therapy*. 2009; 4(2): 70-82.

20 Nickelston P. Primal Rolling Patterns for Core Sequencing. *Dynamic Chiropractic*. Vol. 30(17) Aug.







The starting positions for the leg-initiated rolling patterns are below.



*Leg-initiated rolling patterns*

## NOTES



## **SECTION 4**

# **MOVEMENT TAPING**

The purpose of movement taping is to create more afferent and efferent communication between the brain and the dysfunctional myofascial system being taped. This should give the client more proprioceptive feedback and make their corrective exercise program more effective and efficient. FMT movement taping frameworks are ideally used in conjunction with corrective exercises or movements of some sort rather than as an isolated intervention. Of course, there are many approaches to corrective exercises and a standard rehabilitation progression of closed chain to open chain and stable to unstable movements should be followed.

The basic framework for movement taping is as follows:

1. Assess the client's movement and identify dysfunctional motor/fascial chains.
2. Perform any passive neuromyofascial treatments (soft tissue manipulation, laser therapy, massage, etc.)
3. Lengthen the fascial chain (not isolated muscle, the whole chain!)
4. Tape the fascial chain in the lengthened position
5. Rehabilitate the movement (inhibit, activate, isolate, integrate)

Just as there are many approaches to corrective exercises, there are also many ways to lengthen the fascial chains prior to applying RockTape. It may be done with or without props depending on the needs, balance and flexibility of the patient. It may also be done in a variety of positions, both recumbent and standing or even sitting, as the situation dictates.



*Lengthening the anterior chain*



*Lengthening the posterior chain*



*Lengthening the lateral chain*



*Lengthening the rotational chains*



*Prop-assisted posterior chain lengthening*

In general, the FMT frameworks for movement taping put little, if any, additional stretch on the RockTape being applied. Remember that RockTape has 10-15% stretch when applied to the paper backing, so paper-off tension is enough for the long strips of tape utilized in FMT Performance. Additional stretch may be warranted in some cases, but tape can easily become uncomfortable or overstretched when applied to long fascial chains, so it is best to use minimal additional stretch on the tape for most applications.

During the workshop portions of your Performance course you will be taught to apply RockTape to the

fascial chains in long strips of tape that may pass through sensitive skin zones (like the back of the knee when taping the posterior chain) or under clothed areas like shorts. It is good practice to try to apply these tape strips in one long piece, but practitioner experience has not shown a disadvantage in most cases to cutting the tape into shorter strips to avoid these areas. The Skin Glide Test and tweak taping can also be used to determine if there are specific areas of a long fascial chain that need taping more than other areas, but this can often be more time consuming than simply taping the entire chain.

## NOTES



## **SECTION 5**

# **PERFORMANCE BACK CHAIN**

The Performance Back Chain (PBC) is one of the fascial chains most commonly in need of taping support. It is involved in virtually every sport and human movement. It includes the following muscles and structures:

- Plantar surface of the feet and toe flexors
- Plantar fascia and short toe flexors
- Calcaneus, Achilles' tendon, gastrocnemius and soleus
- Femoral condyles
- Hamstrings
- Ischial tuberosity
- Sacrotuberous ligament
- Sacrum and the sacrotuberous fascia
- Erector spinae
- Occipital ridge
- Galea aponeurotica and epicranial fascia

The Performance Back Chain mostly consists of slow-twitch endurance muscles that help support a fully upright posture. With the exception of the knee joint, they provide concentric contraction when extending and eccentric loading in the flexed position. It extends the head and all areas of the spine and thighs, flexes the knees and plantar flexes the feet.

When the PBC is restricted or shortened, it will restrict multi-segmental forward flexion of the body. Keep in mind, however, that any restriction in the fascia's ability to slide and glide can cause this restriction to be felt anywhere else along the chain. This is why so many people are constantly stretching their hamstrings, for example, which usually does not yield much of a benefit in the ability to bend forward further. The fascia and all its structures work as a unit.





Before applying RockTape, the client needs to lengthen the posterior chain as much as possible for the greatest effect. RockTape will be applied in one long strip (or several broken up strips to avoid the posterior knee and the buttocks area) and will usually be applied to both sides of the posterior chain. The strips usually begin on the bottom of the feet and end at the base of the neck. The best position is one that flexes the head forward, bends the entire spine forward, flexes the hip while keeping the knee in extension and includes dorsiflexion of the foot.



*Various positions that lengthen the posterior chain*

After measuring the appropriate length of RockTape for each PBC strip, it will be applied with paper-off tension. You will likely notice as you practice applying these long strips of RockTape that it tends to stretch a little as it is applied and by the time you get to the cervicothoracic junction area where the second anchor will be applied you will likely have several inches of excess tape, even if you measured and applied it carefully. If this happens, simply trim any excess tape and round the corners before finishing the anchor. It is usually easiest to start at the bottom of the foot and work the tape headward.



*Alternate method with shorter strips*



*Overhead squats*

## NOTES



## **SECTION 6**

# **PERFORMANCE FRONT CHAIN**

The Performance Front Chain (PFC) serves to balance the Performance Back Chain in sagittal plane movements and is a primary generator of power in many sports, including running and sprinting, cycling, basketball, volleyball, soccer and hockey to name a few. It includes the following muscles and structures:

- Dorsal toe extensors
- Short and long toe extensors
- Anterior tibialis
- Anterior compartment
- Subpatellar tendon
- Patella
- Rectus femoris/quads
- Pubic tubercle and anterior inferior iliac spine
- Rectus abdominis
- Sternalis
- Sternochondral fascia
- Sternal manubrium
- Sternocleidomastoid and mastoid process
- Scalp fascia

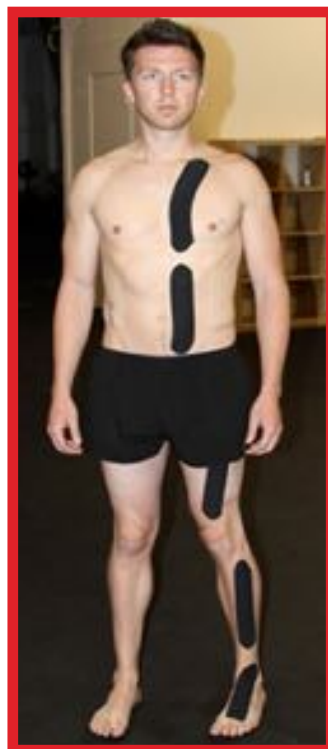
Functionally, the PFC flexes the trunk and hips (upstroke of cycling, swing phase of running), extends the knee (downstroke of cycling, kicking, control of landing forces), dorsiflexes the foot (heel strike, stability of the foot and ankle) and improves core stability by balancing the Performance Back Chain in the sagittal plane. The muscles of the Performance Front Chain consist primarily of fast twitch muscle fibers, lending power to these movements, speed and bursts of acceleration.



Before applying RockTape to the Performance Front Chain, it is necessary to lengthen the front of the body. This may be done standing or while supine, shown in the photos below. RockTape is applied to the dorsal aspect of the foot, up the front of the leg and thigh, along the abdomen a couple of inches lateral to the midline and to the clavicle. As with the Performance Back Chain, smaller strips of tape may be used instead of one long strip to avoid tricky areas.



*Lengthening the Performance Front Chain*



*Segmented approach to taping the PFC*



After taping the client, follow the same inhibit, activate, isolate and integrate model to foster proper movement patterns and stress anterior and posterior movement and stability in the sagittal plane. Examples of this protocol are shown below, including myofascial release of key anterior chain structures, isometric planks on an exercise ball and battle ropes exercises



*Myofascial release using a roller*



*Isometric holds using stability ball*



*Battle ropes exercises*

## NOTES



## **SECTION 7**

# **PERFORMANCE LATERAL CHAIN**

The Performance Lateral Chain is the primary side-to-side mover and stabilizer of the body in the coronal/frontal plane. It serves a function in most sport activities, including running, swimming, jumping, wrestling, boxing and equestrian to name a few. It should always be supported with RockTape in cases of ankle sprains, particularly inversion sprains as the lateral chain is compromised following such an injury. The Performance Lateral Chain is comprised of the following muscles and structures:

- 1st and 5th metatarsal bases
- Peroneal muscles
- Lateral compartment of the leg
- Lateral tibial condyle
- Iliotibial band
- Abductor muscles of the hip
- Tensor fascia lata and gluteus maximus
- Iliac crest, anterior superior iliac spine and posterior superior iliac spine
- Lateral abdominal obliques
- Ribs and internal/external intercostal muscles
- Splenius capitis
- Sternocleidomastoid
- Occipital ridge and mastoid process

The Performance Lateral Chain serves many biomechanical functions. It controls lateral bending of the trunk and is responsible for side-to-side movements in walking, running and cycling. Landing forces from jumping and running as well as torque generated in the hip during squatting are controlled by abduction of the hips. The lateral chain everts the feet, which is part of the propulsion phase of gait. There is also a “braking” mechanism in the lateral chain muscles that controls landing forces and helps stabilize the pelvis and trunk. The Performance Lateral Chain’s connection to the front and back Performance Chains increases complete structural integrity of the body.



As with the other chains, the Performance Lateral Chain (PLC) is lengthened before RockTape is applied, and RockTape may be applied to a large part of the PLC in one long strip or broken up into segments as needed. Pre-application lengthening may be done standing but is most easily accomplished in a side-lying position as shown in the photos below.



*Stick-assisted lengthening of the lateral chain*



*Side-lying lengthening of the PLC*

To tape the Performance Lateral Chain, anchor a strip of RockTape to the bottom of the foot and then extend it laterally over the lateral malleolus, up the side of the leg and knee, the side of the thigh and up the side of the trunk to the lateral scapular area. Be sure to avoid taping the axillary region, as the skin is very sensitive there.



*Applying RockTape supine or standing*



*Alternate segmented approach*

Following the rehabilitation protocol mentioned for the other chains, the lateral chain is easy to do self-myofascial release on with foam rollers, rolling sticks and lacrosse balls or other implements. Exercises such as monster walks and side planks (add kettlebells or dumbbells or unstable surfaces for added lateral chain stability challenges) may be used to stress coronal plane movement patterns and stability.



***Monster walks with exercise band***



***Kettlebell side plank***

## NOTES





## **SECTION 8**

# **FRONT AND BACK FUNCTIONAL CHAINS**

The Front and Back Functional Chains are important myofascial chains for any rotational movements, so they are prime movers and stabilizers in the transverse plane. Dysfunction in the functional chains can cause low back pain, shoulder impingements, scapular stability and movement problems, sacroiliac joint pain and iliotibial band pain. They include a large number of muscles and structures:

- **Back Functional Chain**
  - o Tibial tuberosity
  - o Subpatellar tendon
  - o Patella
  - o Vastus lateralis
  - o Femoral shaft
  - o Gluteus maximus
  - o Sacrum and sacral fascia
  - o Lumbodorsal fascia
  - o Latissimus dorsi
  - o Humeral shaft
- **Front Functional Chain**
  - o Linea aspera of the femur
  - o Adductor longus
  - o Pubic tubercle and symphysis
  - o Lateral sheath of the rectus abdominis
  - o Cartilage of the 5th and 6th ribs
  - o Lower edge of the pectoralis major
  - o Humeral shaft



The performance chains help transmit strain between the upper half and lower half of the body. They connect the arm's fascial lines to the opposite pelvis, necessary for generating power in rotational pulling (rowing, for example), throwing and punching movements. In addition to creating power in these movements, the functional chains also help decelerate them at the.

While there are both front and back performance chains, the back is taped more frequently than the front due to the sensitivity of the skin on the anterior abdomen and chest. That being said, either, or both, may be taped. As with the other chains, lengthen the chain first, then apply RockTape as one strip from the posterior thigh to the contralateral shoulder (Back Functional Chain) or from the posterior thigh, around the hip toward the ASIS, across the abdomen and to the contralateral ribcage (Front Functional Chain). Of course the strips may be broken up into smaller segments for convenience of application, too.

Lengthening the Back Functional Chain is best done in a kneeling position that includes lateral bending and rotation components, as shown below using an exercise ball for support.



***Lengthening and applying RockTape  
to the Back Functional Chain***



***Back and Front Functional Chain taping***

Stressing rotational movements and stability should be at the core of a rehabilitation program for the Functional Chains. Exercises such as Turkish Get-Ups using kettlebells, resistance band rotational pulls and pushes and many others can be used to integrate the entire chains.



***Alternate segmented approach Functional Chain taping***

## NOTES

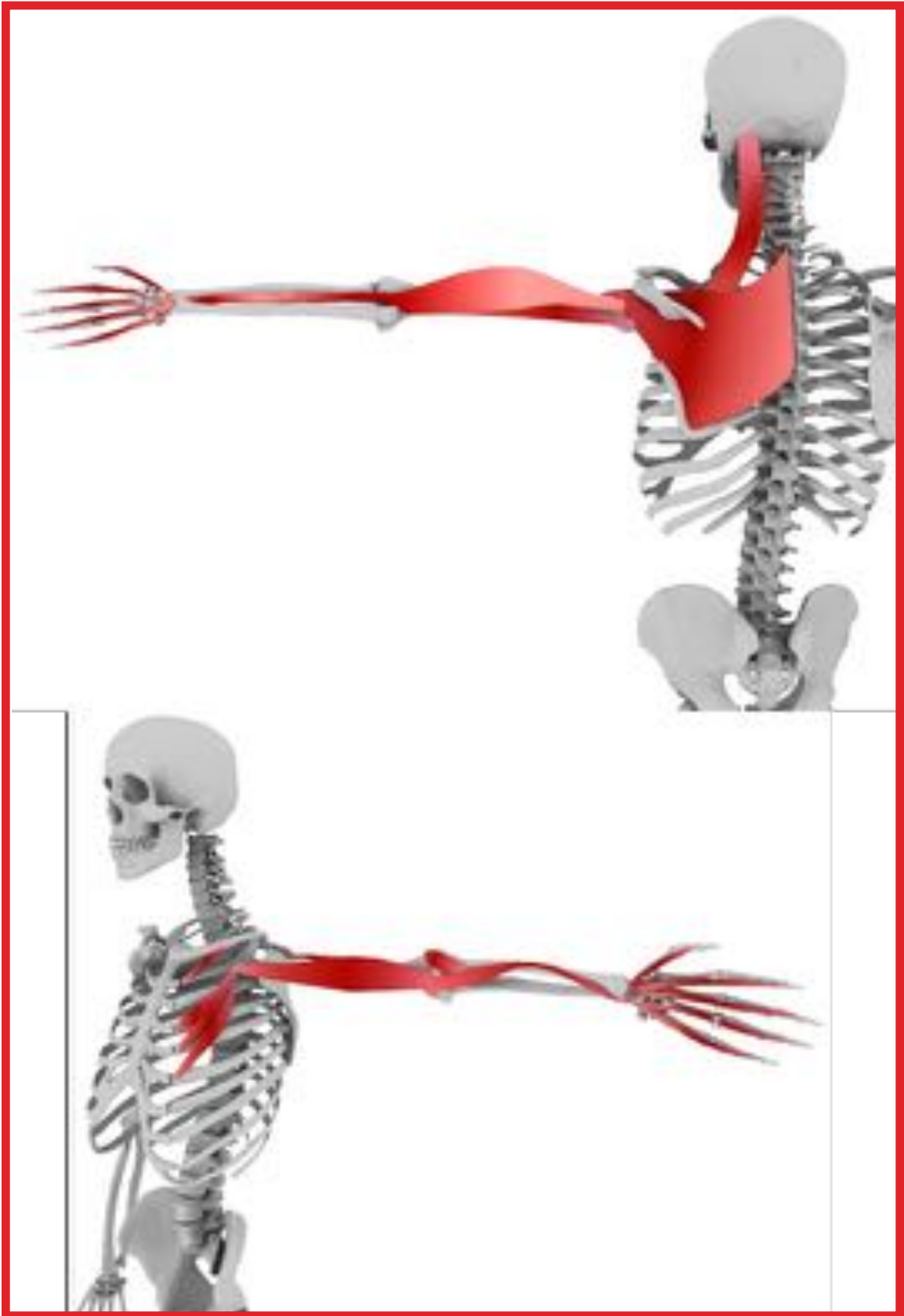
## NOTES



**SECTION 9**

**PERFORMANCE**

**EXTREMITY CHAINS**





The Performance Extremity Chains include all of the structures and muscles of the hand, forearm, arm and scapula including the rhomboids and levator scapula muscles. These chains are used in throwing, pulling and climbing movements, grip and fine dexterity, shooting and tactical operations and serve a stability function for isometric positions of the arms (planks, handstands). They may be taped separately as front or back arm chain, or taped using a spiral pattern that integrates both. The latter is particularly popular in tactical applications such as those developed with input from firearms instructor, Chris Costa.<sup>21</sup>

To apply RockTape to the front performance arm chain, lengthen the front of the arm and chest by extending and abducting the arm and extending the wrist, then apply tape from the upper pectoral area across the front of the deltoid, biceps, anterior elbow, wrist flexor wad and into the palm of the hand. The back performance arm chain is lengthened by flexing the shoulder and crossing the arm across the midline. Apply RockTape from the upper scapular area across the posterior deltoid area, triceps, lateral epicondyle of the elbow and the wrist extensor wad and into the dorsum of the hand.



***Front and Back arm chains***

21 "Tactical Athlete Taping Applications." RockTape. Accessed Dec. 25, 2013. <http://rocktape.com/wp-content/uploads/Rocktape-Tactical-Athlete-Taping-Instructions.pdf>

In pitching and other throwing applications, both chains may be taped as shown above to support acceleration in the throw and aid the deceleration phase with the intrinsic stretch and snapback properties of RockTape. An alternate method of supporting both chains that is particularly effective in cases where the upper extremity has excessive internal rotation is to use a spiral pattern. To apply an upper extremity spiral taping method, first position the client in a palm forward arm position. Begin with anchoring the tape at the front of the wrist then begin applying it in a lateral and superior direction, spiraling around the arm (ideally “catching” the medial elbow and avoiding the sensitive skin in the crease of the elbow), up into the posterior shoulder and upper trapezius area as shown below.





## **SECTION 10**

# **SPORT SPECIFIC FASCIAL MOVEMENT TAPING**

Movement, whether related to activities of daily living and work or sports, has been a key component throughout your Fascial Movement Taping training courses. An exciting aspect of FMT is the role it plays in sports performance, injury prevention and improved recovery. As such, kinesiology taping has been fully embraced by coaches, trainers and clinicians who count athletes as patients. To this point, FMT Performance training has focused on movement assessment and the identification of faulty movement patterns. Using RockTape to support the dysfunctional myofascial chain and then rehabilitating the patient to foster proper movement is the core of the FMT Performance framework.

At the same time, however, by knowing the fascial chains that are stressed the most in different sports it is also possible to use RockTape as a preventive measure, supporting already normal movement and using its properties to add power, speed, agility and aid recovery during training and sports activity. It serves a purpose for uninjured athletes as much as it does for injured ones when applied in this way. During the most recent Olympics most athletes from divers to track cyclists were using RockTape, not because of injuries, but to gain an edge on their competitors... to help flex just a little bit easier during a dive or to shave a second from a sprint time or to recover from an event faster. While treating the results of an injury is a noble pursuit, using methods to prevent injury in the first place while also improving performance is the epitome of practice for many manual therapists.

It is important to keep in mind that while this aspect of FMT is geared toward athletic performance, the movements of athletics and those of daily life are more or less the same, so these applications apply to an office worker or someone working on a line in a factory as much as they do to someone participating in a sport. Fatigue, intensity and load serve to reveal dysfunctional movement patterns faster and often more dramatically in the athlete, but it is just as important to look at our non-athletic patients and clients from the perspective of prevention, too.



Timing is one of the key principles of how RockTape can be used to enhance athletic performance. Every movement requires the same sequence of activation, preloading, joint stabilization, unloading (release of energy) and then recovery to occur. Repeating this cycle over and over again, often at a rapid pace, requires exquisite rhythm and timing, as well as coordination with other muscles in the fascial chain. If any step in the sequence is delayed or premature then the timing of the entire sequence is altered, usually for the worse.<sup>22 23</sup> Timing relates back to the concept of joint centration and postural alignment of the functioning segments<sup>24</sup> and it is known that timing, sequencing and overall muscle coordination is an effect of habit and training.<sup>25</sup>

Magnify this timing deficit across an entire movement involving multiple regions of the body and many muscles connected through the myofascial chain, and then repeat it over hundreds, if not thousands, of cycles, and it is easy to see how even the most minute problem in coordination or stability can translate to the difference between first place and last place, or uninjured as opposed to injured. Because RockTape has the ability to augment the sensorimotor pathways and enhance cutaneomotor coordination, it is uniquely suited to have a positive benefit on the timing and sequencing that translates to improved performance.

Wong's study of isokinetic knee function in healthy subjects showed that subjects who were taped with kinesiology tape "demonstrated significant shorter time to peak extension torque."<sup>26</sup> The amount of torque was the same whether the subjects were taped or not, but the time it took to generate peak torque was reduced, altering the timing of the joint's function. Similar findings occurred in a study using McConnell style taping of the knee in subjects suffering from patellofemoral pain. In this study, the "temporal characteristics of VMO and VL activation" were changed in the group who had pain and were taped.<sup>27</sup> The results of this study were replicated using kinesiology tape by a group of researchers from Taiwan. The paper, presented at the 21st International Society of Biomechanics Congress concluded "[kinesiology] tape would change in timing of VMO and improve the ratio of VMO/VL for the mechanism of efficacy."<sup>28</sup> In other words, kinesiology taping of the knee altered the timing of the vastus medialis obliquus muscle and also improved the ratio of coordination between the VMO and the vastus lateralis muscle.

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22 Chapman AR et al. Patterns of leg muscle recruitment vary between novice and highly trained cyclists. *Journal of Electromyography and Kinesiology*. 2008; 18:359-371.

23 Chapman AR et al. Do difference in muscle recruitment between novice and elite cyclists reflect different movement patterns or less skilled muscle recruitment? *Journal of Science and Medicine in Sport*. 2009; 12(1):31-34.

24 Chapman AR et al. The influence of body position on leg kinematics and muscle recruitment during cycling. *Journal of Science and Medicine in Sport*. 2008; 11:519-526.

25 de Rugy A et al. Muscle coordination is habitual rather than optimal. *The Journal of Neuroscience*. 2012; 32(2):7384-7391.

26 Wong OM et al. Isokinetic knee function in healthy subjects with and without kinesio tape. *Physical Therapy in Sport*. 2012; 13(4):255-258.

27 Cowan SM et al. Therapeutic patellar taping changes the timing of vasti muscle activation in people with patellofemoral pain syndrome. *Clinical Journal of Sport Medicine*. 2002; 12:339-347.

28 Chen WC et al. Effects of kinesio taping on the timing and ratio of vastus medialis obliquus and vastus lateralis muscle for person with patellofemoral pain. XXI ISB Congress. July 3, 2007. *Journal of Biomechanics* 40(S2).

Kinesiology tape has been shown to have beneficial affects on lower extremity Functional Movement Screen scores<sup>29</sup> and in some cases in the peak torque generated by a muscle.<sup>30</sup> All of these studies point to the fact that motor pattern coordination is the result of habit, repetition and practice, that better athletes have better muscle timing and balance and that taping techniques can alter the timing, sequencing and balance of muscles by affecting cutaneomotor activity and altering central nervous system function.

## NOTES

29 An HM et al. The effect of kinesio tape on lower extremity functional movement screen scores. *International Journal of Exercise Science*. 2012; 5(3):196-204.

30 Fratocchi G et al. Influence of kinesio taping applied over buceps brachii on isokinetic elbow peak torque. A placebo controlled study in a population of young healthy subjects. *Journal of Science and Medicine in Sport*. 2013; 16(3):245-249.

## RUNNING

On face value, running seems to be a sagittal plane activity that involves mostly front and back movement, however closer investigation shows that good runners have better control of lateral movement as well as rotational movement over the course of their gait cycle. In fact walking gait mechanics, particularly x-axis translation (side-to-side movement) and y-axis translation (up and down movement) do not fully develop until adolescence,<sup>31</sup> proof of the amount of neuromuscular coordination the activity involves.



*Pre-contact, contact and swing phases of gait*

Gait biomechanics are extremely complex, however they can be approached from a rather simplistic perspective for the purposes of clinical intervention from a fascial perspective. In the sagittal plane, the ability of the hip to fully extend on the trailing limb is of utmost importance, as is the length of the stride on the forward limb. If the hip does not fully extend it will cause the lumbar spine to extend and load the sacroiliac joints excessively with every step, essentially making this region hypermobile. Long strides that feature a heavy heel-strike require the anterior leg muscles to “brake” the foot’s plantar flexion after heel strike to help mitigate the spike in ground reactive forces and prevent foot slap. This is the perfect setup for shin splints.

31 Michaud TC. Human Locomotion: The Conservative Management of Gait Related Disorders. Newton Biomechanics. 2011.



In the coronal or frontal plane, lateral movements of running can be seen. Watch for the amount of side-to-side translation in the pelvis as well as for excessive crossover gait at the heels, both of which are due to lateral chain dysfunctions. Power in the gait cycle is produced by rotational movements coordinated between the upper and lower halves of the body, so while they are often difficult to observe, do not neglect to assess runners for transverse plane dysfunctions and core disorganization through use of the push-up test, staggered stance assessment, one-legged stance assessment or rolling patterns.



*Crossover gait with lateral chain taping*





*Taping the posterior chain to mitigate overstride*

## SWIMMING



*Three phases of the swimming stroke*

Like running, swimming appears to be mostly a sagittal plane activity, but it also involves power generation from rotational components that can be investigated through movement assessment. Many of the problems of swimming relate to upper extremity and scapulothoracic dysfunctions. A basic swimming stroke includes a catch phase where the arm contacts the surface of the water in a fully flexed (overhead) position, the pull phase and the end pull or initial recovery phase where the arm transitions into extension.

Like the hip needs to generate torque during walking, running and activities like squats, so does the glenohumeral joint during upper extremity movements. This torque essentially tightens the capsular ligaments of the joint to provide a stable and powerful platform for movement. In the shoulder, torque is created through internal and external humeral rotation. When flexed, or overhead, the glenohumeral joint is most stable when coupled with external rotation of the humerus. In the extended position, the joint benefits most from internal humeral rotation.<sup>32</sup>

Applied to swimming, the arm is repeatedly cycled from full flexion to full extension, requiring full range of motion of internal and external rotation as the arm transitions through the stroke positions. Lack of glenohumeral range of motion, whether it is intrinsic or being caused by scapular instability or lack of extension in the thoracic spine, can force the shoulder to roll inward at the end of each stroke in compensation. This sets up the shoulder for impingements and rotator cuff problems.

Taping the posterior arm chain gives a swimmer increased awareness of the elbow, wrist and scapula, helping with the high elbow position of the pull and the heavy internal rotation demand at the end of the stroke.



## NOTES

## THROWING

Throwing makes great use of the arm fascial chains as well as the Front and Back Functional Chains to generate power through rotation of the trunk. Throwing, particularly baseball pitching, can create great strain on the glenohumeral joint and elbow in particular. RockTape is useful for throwers in both the cock-up as well as the deceleration phase of the movement. Large amounts of rotational torque are generated in the elbow and shoulder just before the arm reaches maximum external rotation while a huge amount of compression is created in the shoulder shortly after ball release.<sup>33</sup> This must be decelerated by the posterior arm chain. Using RockTape on the anterior arm chain provides increased snapback, possibly generating more potential energy at the apex of the cock-up phase while using RockTape on the posterior arm chain helps control scapular kinematics and uses the tape to offload some of the work of deceleration from the body.



*Cock up and deceleration phases of throwing*

33 Fleisig GS et al. Kinetics of baseball pitching with implications about injury mechanisms. American Journal of Sports Medicine. 1995; 23(2):233-239.

Another approach is to combine taping of the arm chains and the Performance Functional Chains to support the trunk rotational movement and stability as well as the various phases of throwing. Shown below are combinations of the anterior arm chain and Front Performance Functional Chain as well as the back arm chain and Back Performance Functional Chain. Of course, both of these could be done on the same client at the same time, as well.



*Combination of front functional chain and arm chain*



*Combining back arm chain and functional chain*



## KICKING

In many ways kicking is a lower extremity analog to throwing, where power is generated by the lower extremity as well as through trunk rotation. Similar to throwing, kicking involves a pre-loading phase where power is generated in the elastic build up of potential energy in the fascial system. Then that energy is released and there is a need for joint stability in the contact phase. Finally, there is follow-through and deceleration after contact has been made with a ball or opponent, depending on the sport.



*Phases of kicking movements*



As with throwing, RockTape can be used to create more elastic build-up of energy in the pre-loading phase and its snapback can help create more power during the kick itself. Typically the Performance Front Chain or a combination of the Performance Front Chain and the front Functional Chain are taped for improving kicking power. Deceleration is a problem with kicking as much as it is with throwing, however, so many kicking-related injuries have to do with the deceleration phase of the swing leg. Soccer players, for example, frequently have pain on the back of the kicking leg because of the deceleration demands on the posterior chain of the leg and thigh. A strategy for this problem is to use Performance Back Chain taping of the back of the kicking leg and use stability taping applications, such as a lower extremity spiral, on the support leg.



*Performance Front Chain support in kicking*

NOTES



## CYCLING

Of all the sports mentioned in this Study Guide, cycling is the one whose movements occur primarily in one plane (sagittal), although management of lateral movements, particularly in climbing and sprinting, are important for the clinician. Pedaling, particularly during sprints and climbs while out of the saddle, also makes great use of the Functional Chains to coordinate opposite sides of the upper and lower body to generate power.

Supporting the upper and lower extremity chains to reduce fatigue and vibrational stress are popular in all types of cycling, as is diaphragm taping (particularly during mountain stages of road races) and taping of the posterior chain to support the forward flexed position the cyclist often maintains for hours at a time. Some cyclists have a tendency toward varus or valgus knee positions at various moments in the pedal stroke that RockTape can help correct.



*Upper and lower extremity chain taping*



*Performance Back Chain support in the tucked position*



*Valgus and varus knee positions*



## NOTES

## NOTES



## **SECTION 11**

# **TWEAK TAPING**

Tweak taping is a novel method pioneered by FMT and RockTape. It is a series of taping applications that aim to improve regional function by altering and optimizing alignment of either joint or myofascial structures. Tweak taping is based on the regional interdependence model first seen in your FMT Basic course. By taping areas of stability loss, it is possible to “reset” the normal pattern of stability and mobility that is defined by regional interdependence and see improvements in mobility and stability patterns. The normal pattern of stability and mobility in the body is as follows:

- Foot – stable
- Ankle – mobile
- Knee – stable
- Hip – mobile
- Sacroiliac joints and lumbar spine – stable
- Thoracic spine and cervical spine – mobile
- Scapulothoracic joint – stable
- Glenohumeral joint – mobile
- Elbow – stable
- Wrist and hand – mobile



As stated in your FMT Basic Study Guide, changes in the pattern expressed in regional interdependence can create both local problems in that region as well as remote problems due to the compensation that must establish itself. It is no wonder that manual therapists spend so much effort to mobilize the thoracic spine and stabilize the scapula and core, for example. The art of manual therapy is determining what the source of a patient’s problem is, and that is often not the place where the patient is experiencing the most pain.

In the tweak taping framework, the Skin Glide Test (SGT) previously seen in FMT Basic is used to determine if creating a specific strain/shear pattern in the skin and fascia will result in a beneficial change in whatever marker you are assessing. Generally pain and range of motion are the common markers to assess with the SGT. To use this method, perform a movement assessment or range of motion and look for the quantity and quality of motion as well as asking the patient about the presence of pain with the movement. Manually apply light directional glide to the skin over a joint or myofascial tissue that is involved in the movement and repeat the movement, looking for a change in the quantity, quality or pain involved. Use trial and error by gliding the tissue in several vectors to establish which is the best one, then apply a strip of tape with a firm amount of stretch in the direction of the improved SGT. Keep in mind that the anchors of your tape strips should never be stretched as it be uncomfortable and will cause the tape to peel up prematurely.



***Skin Glide Test of the shoulder***



***Skin Glide Tests of the sacroiliac joint***





## STEP-BY-STEP INSTRUCTIONS FOR SHOULDER TWEAK TAPING

We will use the shoulder as an example for the tweak taping framework that can be applied to any region of the body. The target joint in this example is the glenohumeral joint and its various ranges of motion. This tweak taping approach may be used for shoulder pain, impingement syndromes, rotator cuff and labral tears and even nerve irritation into the arm.

Example markers to be assessed in this case include the push-up test, throwing, active shoulder range of motion, the empty can test and any other pain or range of motion based test for the shoulder. When you have chosen which marker to assess, use the Skin Glide Test over various areas of the joint and dragging the skin in various directions while repeating the test for each skin glide. When you have found the greatest improvement in your marker, use RockTape in that direction to mimic the Skin Glide Test that created the improvement.



*Skin Glide Test of the shoulder*

After the skin glide tests have been performed and a directional improvement has been noted, the tweak taping framework for the shoulder is as follows:

- Locate the epicenter of pain from which you were performing the skin glide tests.
- Cut a strip of 2-inch wide RockTape that will extend into the upper arm and round the corners.
- Anchor one end of the RockTape strip just ahead of the epicenter of pain so it can be extended in the direction of the positive skin glide test.
- Apply significant stretch to the strip of tape as you apply it in the direction of the skin glide test that improved the marker, finishing the second anchor with no stretch.

In the example photos below the marker was improved with a proximal to distal skin glide test over the top of the glenohumeral joint, so the tape is anchored slightly proximal to the epicenter of pain, then stretched down the deltoid area and finished without stretch in the direction of the glide test.



*RockTape applied in the direction of the skin glide test*

This tweak taping framework can be applied to any joint, again always using the Skin Glide Test to look for an improvement in the marker you are assessing. Another use for tweak taping is to determine if there is a best direction for the decompression strip in a pain taping application. In such a case the Skin Glide Test is applied over the epicenter of pain, again. If one direction creates more decrease in pain, that is the direction in which to apply the tape. When using tweak taping in this way, the decompression strip is applied differently than it was throughout the FMT Basic course frameworks. Anchor the decompression strip close to the area of pain, then pull the skin in the direction of the positive change with the Skin Glide Test and tape with 40-80% stretch on the strip in the direction of the skin drag. Finish the second anchor with no stretch.



*Decompression tweak taping glide test*

## NOTES

# MOVEMENT SCREENING WORKSHEET

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## ASSESSMENT: BREATHING

- ☐ Mouth breathing    ☐ Vertical breathing pattern    ☐ Chest initiation    ☐ Paradoxical

## ASSESSMENT: DOUBLE LEG SCREEN

- ☐ Heels off floor    ☐ Heel eversion/ball of foot pivots  
☐ Knee int. rotation/valgus    ☐ Knees anterior of toes    ☐ Excessive calf/hamstring contact  
☐ Pelvic counter-nutation @ bottom position    ☐ Thighs contact abdomen  
☐ Ribcage rotation    ☐ Ribcage too horizontal    ☐ Ribcage lateral flexion L/R  
☐ Scapular winging    ☐ Protraction of scapula/rolling of shoulders forward  
☐ OHS: bar too anterior (shoulder flexion fault)

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: STAGGERED STANCE SCREEN

- ☐ Forward leg reduced flexion (trailing knee not touching ground)  
☐ Forward leg ankle off floor (reduced ankle dorsiflexion)  
☐ Trailing leg hip not extended fully  
☐ Pelvic drop L/R on forward leg  
☐ Lateral trunk flexion L/R    ☐ Trunk rotation L/R    ☐ Trunk forward lean

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: SINGLE LEG SCREEN

- ☐ Lateral shift of pelvis toward support leg    ☐ Flexion of trunk/pelvis over support hip  
☐ Trunk forward flexion    ☐ Trunk rotation L/R  
☐ Knee internal rotation/valgus L/R    ☐ Knee external rotation/varus L/R

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: PUSH SCREEN

- ☐ Hyperlordosis of lumbar spine    ☐ Flexion of lumbar spine/pelvis pushed toward ceiling  
☐ Scapular winging L/R    ☐ Trunk rotation relative to pelvis L/R

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: SCAPULAR SCREEN

- ☐ Reduced height of arm L/R    ☐ Reduced internal rotation of arm L/R

## ASSESSMENT: ROLLING SCREEN

- ☐ Unable R arm supine to prone    ☐ Unable L arm supine to prone  
☐ Unable R leg supine to prone    ☐ Unable L leg supine to prone  
☐ Unable R arm prone to supine    ☐ Unable L arm prone to supine  
☐ Unable R leg prone to supine    ☐ Unable L leg prone to supine



# MOVEMENT SCREENING WORKSHEET

---

## ASSESSMENT: BREATHING

- ☐ Mouth breathing    ☐ Vertical breathing pattern    ☐ Chest initiation    ☐ Paradoxical

## ASSESSMENT: DOUBLE LEG SCREEN

- ☐ Heels off floor    ☐ Heel eversion/ball of foot pivots  
☐ Knee int. rotation/valgus    ☐ Knees anterior of toes    ☐ Excessive calf/hamstring contact  
☐ Pelvic counter-nutation @ bottom position    ☐ Thighs contact abdomen  
☐ Ribcage rotation    ☐ Ribcage too horizontal    ☐ Ribcage lateral flexion L/R  
☐ Scapular winging    ☐ Protraction of scapula/rolling of shoulders forward  
☐ OHS: bar too anterior (shoulder flexion fault)

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: STAGGERED STANCE SCREEN

- ☐ Forward leg reduced flexion (trailing knee not touching ground)  
☐ Forward leg ankle off floor (reduced ankle dorsiflexion)  
☐ Trailing leg hip not extended fully  
☐ Pelvic drop L/R on forward leg  
☐ Lateral trunk flexion L/R    ☐ Trunk rotation L/R    ☐ Trunk forward lean

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: SINGLE LEG SCREEN

- ☐ Lateral shift of pelvis toward support leg    ☐ Flexion of trunk/pelvis over support hip  
☐ Trunk forward flexion    ☐ Trunk rotation L/R  
☐ Knee internal rotation/valgus L/R    ☐ Knee external rotation/varus L/R

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: PUSH SCREEN

- ☐ Hyperlordosis of lumbar spine    ☐ Flexion of lumbar spine/pelvis pushed toward ceiling  
☐ Scapular winging L/R    ☐ Trunk rotation relative to pelvis L/R

- Affected Chains:    ☐ Back    ☐ Front    ☐ Lateral    ☐ Core    ☐ Functional (rotation)  
                          ☐ Extremity

## ASSESSMENT: SCAPULAR SCREEN

- ☐ Reduced height of arm L/R    ☐ Reduced internal rotation of arm L/R

## ASSESSMENT: ROLLING SCREEN

- ☐ Unable R arm supine to prone    ☐ Unable L arm supine to prone  
☐ Unable R leg supine to prone    ☐ Unable L leg supine to prone  
☐ Unable R arm prone to supine    ☐ Unable L arm prone to supine  
☐ Unable R leg prone to supine    ☐ Unable L leg prone to supine





The popularity and use of kinesiology tape (k-tape) has increased dramatically over the last seven years. Despite the fact that it was invented in the 1970's by Dr. Kenzo Kase, k-tape rose to prominence following the Beijing Olympics in 2008. K-tape is increasingly being used by athletes at all levels, ranging from Olympians to weekend warriors. While k-tape's popularity continues to grow, there is still significant debate about k-tape's clinical efficacy. This is due in part to the historical beliefs of many practitioners who cling to out-dated and unsupported theories about the purported benefits of k-tape. At Rocktape, we are committed to furthering the body of scientific knowledge on the effects of k-tape and to demonstrating the positive benefits that we see clinically every day. We are actively supporting research that is currently being conducted around the world, and we promote “evidence –informed” education in all of our courses. As emphasized by Sackett et al<sup>1</sup>, we understand that evidence-based practice relies not only on the scientific literature, but also on the clinical experience of the provider and patient expectations (Figure 1).



Figure 1. *Evidence based approach to rehabilitation.*<sup>1</sup>

The Centre for Evidence Based Medicine (CEBM) encourages clinicians to make decisions based on the best evidence available.<sup>2</sup> High levels of evidence on the effects of k-tape as specified by the CEBM are lacking. While systematic reviews and meta-analyses, among the highest levels of evidence, do exist, they are divided in their conclusions. Additionally, a lack of high quality reviews stems from a lack of high quality individual studies on the effects of k-tape. As such, the literature remains divided on its efficacy.

Regardless of literature available, it has become clear that some of the original beliefs about k-tapes are simply not grounded in science. Most notably is the idea that the direction in which the tape is applied results in facilitatory or inhibitory effects on the targeted muscle. Vercelli et al<sup>3</sup> compared the effects of no tape, origin to insertion tape, and insertion to origin tape on quadriceps strength and limb performance in healthy individuals. They found that there were no differences between groups with regard to strength or performance.<sup>3</sup> This finding support the common sense view that direction of application does not play as great a role in performance improvement as simply have tape on the skin does.

Another commonly held belief about the application of k-tape is that a large amount of tension is needed to elicit a response. However, studies that utilized sham, or placebo, k-tape application, indicate that this is not the case. It is important to note that, with regard to the k-tape literature, “sham” refers to the application

technique and not to the tape itself. Gonzalez-Iglesias et al<sup>4</sup> compared the effects of traditional k-tape application to a sham application on neck pain and range of motion in individuals with whiplash. They found that these measures improved significantly regardless of the amount of stretch applied to the tape.<sup>4</sup> Additionally, Thelen et al<sup>5</sup> compared the effects of k-tape application and sham tape on shoulder pain, disability, and pain free range of motion in individuals with shoulder impingement. They found that both k-tape and sham improved pain and pain free range of motion.<sup>5</sup> These findings suggest that, once again, tension does not appear to be as important as cutaneous stimulation in improving outcomes.

Currently, it is unclear if the effect of k-tape application on the muscle are excitatory or inhibitory, as studies show conflicting results. It is possible that k-tape may have different effects on different muscle groups. For example, Lumbroso et al<sup>6</sup> compared the effects of k-tape on the gastrocnemius and on the hamstring on force production. They found that KT showed an immediate, significant, and sustained (two days post-application) increase in force production in the gastrocnemius group.<sup>6</sup> While there was no immediate effect of k-tape on force production in the hamstring, following two days of application force increased significantly as well.<sup>6</sup> And while Wong et al<sup>7</sup> showed no change in peak torque production of the quadriceps with the application of k-tape, they did show that quadriceps with k-tape were able to achieve peak torque more quickly compared to a no tape condition. Chen et al<sup>8</sup> investigated the effects of k-tape application on vastus medialis oblique and vastus lateralis activation during stair descent in individuals with knee pain. They found that both muscles had had earlier onset activation, which suggests that k-tape improves functional control during stair descent when compared to controls without tape.<sup>8</sup> It is important to note the, despite these findings, results among studies still conflict.

It is theorized that injured individuals and individuals in pain have distorted sensory awareness of the affected body part and, in some cases, in the contralateral limb. It is theorized that by stimulating the mechanoreceptors in the skin and subcutaneous tissue, k-tape may provide the brain with additional input regarding the body's position in space, thereby making the wearer more cognizant of the taped area. In individuals with chronic low back pain, Bae et al<sup>9</sup> found that k-tape in conjunction with usual care resulted in a better pattern of abdominal muscle recruitment compared with pre-treatment measures. Additionally, Parreira et al<sup>10</sup> found that regardless of the technique of application, k-tape was helpful in reducing pain and disability in individuals with chronic low back pain. This effect was even somewhat maintained eight weeks after the treatment ceased.<sup>10</sup> Griebert et al<sup>11</sup> showed that k-tape can have a positive effect on biomechanics in individuals either with or prone to medial tibial stress syndrome, or shin splints. K-tape application in this group improved their foot loading patterns as they walked across a force plate, yet the same application made no difference to a control group with normal biomechanics.<sup>11</sup> These findings highlight one of the most exciting developments with regard to k-tape: the powerful effect that the tape may have on correcting abnormal movement patterns and postures.

It may also be the case that healthy, asymptomatic individuals, who are often subjects in k-tape research, are less likely to show an effect from taping. This may be because any additional input to the brain the tape provides could be quickly dismissed as unimportant since the system is not compromised. In states of pain or fatigue when the system is compromised, it is possible that additional afferent input may be considered more meaningful. This may result in a positive effect on efferent output. For example, Thedon et al<sup>12</sup> compared the effects of two conditions (control and k-tape) applied to the Achilles tendon on standing balance before and after exercise to fatigue. While subjects demonstrated similar sway patterns before fatigue, they swayed significantly less in the k-tape condition following fatigue.<sup>12</sup> The authors surmised that individuals preferred to use their muscle spindle input when this input was reliable.<sup>12</sup> However, when muscle

spindle input was degraded through fatigue, the brain utilized information provided by the k-tape on the skin, which results in better standing balance compared to the control condition. Similarly, Konishi<sup>13</sup> compared quadriceps strength before and after the application of k-tape following fatigue. He found that subjects had greater quadriceps strength with the k-tape condition compared to baseline.<sup>13</sup> There were no differences in strength before fatigue for no tape and k-tape conditions.<sup>13</sup> Cortesi et al<sup>14</sup> found that standing balance improved in subjects with multiple sclerosis who had their Achilles' tendons taped. These findings support the notion that tape can provide substantial improvements in balance in individuals with compromised sensory input. Supplementary information applied to the cutaneous mechanoreceptors k-tape may help improve outcomes.

The exact physiological mechanism of action for k-tape remains unknown. While many studies have investigated the effect of k-tape on various parameters, such as pain, inflammation, muscle function, and joint position sense, there is very little research on how it may alter these parameters. In a recent, unpublished study from the US, researchers used ultrasound imaging to show that k-tape does have a lifting effect on the subcutaneous tissue layers. By imaging and comparing pre- and post-tape applications, researchers demonstrated a visible change in the interstitial space. This early finding is in line with the long-held belief that k-tape's mechanism of action is partially achieved through decompression of local tissues. Clinically, this may be the reason we often see dramatic changes in the reduction of swelling and in the reduction of hematomas with k-tape application. This lifting effect creates convolutions on the skin that may potentially decompress the lymphatic vessels and allow exudates to be removed from the area more easily. The same lifting effect is also thought to improve circulation to the area, allowing ecchymosis to be cleared more efficiently. Finally, the lifting effect may simultaneously decrease the pressure on the superficial nociceptors and stimulate the mechanoreceptors, leading to less perception of pain in the underlying tissue. All of these factors combined may allow injured individuals to return to proper form and function more quickly. Research seems to support this idea as it relates to inflammation. Tsai et al<sup>15</sup> demonstrated k-tape application in conjunction with usual therapy was equally effective with regard to control of breast cancer related lymphedema when compared with traditional short stretch bandaging and usual therapy. Additionally, subjects with k-tape displayed greater compliance, decreased difficulty in use, and greater self-reported comfort compared with subjects with the short stretch bandages.<sup>15</sup> These findings suggest that k-tape may be a valuable tool in the management of lymphedema. In this study, it provided similar benefits to short stretch bandaging over a one month period and was associated with greater patient comfort.

Improvements in circulation may also result in improvements in Delayed Onset Muscle Soreness (DOMS) demonstrated in a study by Bae et al<sup>16</sup>. They found that DOMS symptoms resolved faster in individuals with k-tape application compared to a sham tape control group. Tsai et al<sup>17</sup> investigated the effect of k-tape application on pain and plantar fascia thickness in individuals with plantar fasciitis. The k-tape group showed a significantly greater reduction in pain scores compared to controls. More interestingly, the k-tape group demonstrated a significantly greater reduction in the thickness of the plantar fascia at the insertion site as measured by a blinded ultrasonographer compared to controls. Additionally, Karwacinska et al<sup>17</sup> showed a positive effect of k-tape application in children with hypertrophic and keloid scarring over a twelve week period. The reduction in scarring may also be suggestive of changes in circulation to the taped area and also to the benefits of low threshold skin shear on a scar over long periods of time. These findings suggest that k-tape allows for an increase in circulation that facilitated tissue remodeling.

## FUTURE DIRECTIONS FOR KINESIOLOGY TAPING RESEARCH

There is much to do regarding further research into the effects of kinesiology taping.

- To begin, we need small, well designed efficacy trials to further define what needs investigating in future larger, randomized controlled studies.
- We need large, randomized controlled studies to validate the findings of recent, smaller pilot studies. These smaller studies include those that have demonstrated decreases in subjects' pain, improvements in performance, and reductions in the negative performance effects of fatigue.
- We need to determine the optimal length of time of application of the tape. There have been some interesting findings, such as by Lumbroso et al<sup>6</sup> previously described. They found an immediate increase in excitability of the gastrocnemius in healthy individuals following k-tape application and a delay in a similar excitability in hamstrings. Many studies have not found significant benefits from immediate k-tape application, but have not re-tested 24-48 hours later. It is possible that the tape has a delayed effect resulting from slow adapting mechanoreceptors. Kaya et al<sup>18</sup> compared physical therapy with either the use of modalities or k-tape in individuals with shoulder impingement with regard to pain and disability. They found that pain in the k-tape group decreased significantly more than pain in the modality group after the first week of treatment.<sup>18</sup> Following two weeks of treatment, the k-tape group had significantly lower disability than the modality group.<sup>18</sup> These findings indicate that pain decreased first and that functional scores improved later. A delayed effect may have implications for methods of future studies.
- The effect of k-tape in certain populations needs further study. There have been some interesting case studies published on the effects of k-tape in individuals with cerebral palsy investigating the effect of various taping techniques on function; however, larger, randomized studies could follow.
- Further research should be done to build upon early positive findings of the effects of k-tape on inflammation and lymphedema management. This area of study should be expanded to investigate the application of k-tape on inflammation resulting from orthopedic injury, surgery, and high intensity exercise.
- Can k-tape play a role in the prevention of injuries through improved neuromuscular control? Many studies have identified risk factors for certain injuries that could be addressed with taping. For example, Cameron et al<sup>19</sup> studied the hamstring muscle group in Australian Rules football. They postulated that hamstring injuries could occur through errors in position sense during foot contact with the ground while running.<sup>19</sup> Some studies into k-tape have demonstrated improved position sense or force sense in taped subjects, including those by Chang et al<sup>20</sup>. It would be interesting to know if k-tape has benefits in athletes prone to hamstring injuries. Greg Myer's group out of Cincinnati Children's hospital has produced numerous papers looking at the risk factors for ACL injuries and patellofemoral pain in adolescent girls. The main risk factor identified by these studies is the valgus collapse that often occurs in landing and cutting actions.<sup>21</sup> This is the result of decreased hamstring recruitment and poor trunk control leading to increased hip adduction and internal rotation.<sup>21</sup> The effect of spiral taping of the lower limb would be interesting in this group of female athletes identified as having high risk for ACL rupture or patellofemoral pain.

There is much work to be done before k-tape can be considered as having a rigorous basis in evidence. However, it is often said that the lack of evidence does not constitute evidence of lack. Anecdotally, practitioners around the world continue to see benefits in their patients following k-tape application. It may be that we as clinicians need to avoid being blinded by old theories about k-tape's mechanism of action and embrace the role of the central nervous system in pain and movement disorders before we can truly understand the role of this family of tapes.

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