Understanding Myofascial Restrictions Home Study Course

1 CE Hour

Text, Examination, and Course Guide

Presented by the:

Center for Massage Therapy Continuing Education

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Instructions for the Understanding Myofascial Restrictions home study course

Thank you for investing in the Understanding Myofascial Restrictions home study course, a 1 CE hour course designed to further your knowledge in the principles and practice of treating clients with signs and symptoms myofascial restrictions. This guide will contain all of the instructions you will need to complete this course. This is a 1 CE hour course, so that means it should take you approximately 1 hour to read the text and complete the multiple choice exam and course evaluation.

The following are steps to follow in completing this course:

1. **Read and review the exam and text in this file. The exam is provided for review before testing online and is the same as the online exam.**

2. **When you are ready to test online, access the online examination by logging in to your account at** https://www.massagetherapyceu.com/login.php.

3. **Complete your examination and print your certificate. The exam is open book and there is no time limit for completion.**

You must pass the exam with a 70% or better to pass this home study course. You are allowed to access and take the exam up to 3 times if needed. There is no time limit when taking the exam. Feel free to review the text while taking the test. This course uses the text *Fascia, an excerpt from Condition-Specific Massage,* by Celia Bucci. All of the answers can be found in the text. It is advised to answer the exam questions in the study guide before testing online. That way, when you are testing you do not have go back and forth through the online exam.

If you have any questions please feel free to contact us at 866-784-5940, 712-490-8245, or info@massagetherapyceu.com. Most state boards require that you keep your "proof of completion" certificates for at least four years in case of audit. Thank you for taking our Understanding Myofascial Restrictions home study course.

It is the responsibility of the practitioner to determine the appropriateness of the techniques presented in terms within the scope of practice. This information is in no way meant to diagnose or treat medical conditions. Written medical opinions are always the best way to resolve any questions regarding contra-indications to or advanced treatment of myofascial restrictions.

Understanding Myofascial Restrictions Exam

1. Fascial fibers form loose or dense, regular and irregular connective tissue with a/an __________ arrangement.
    a. Horizontal
    b. Vertical
    c. Unidirectional
    d. Multidirectional

2. __________ gives fascia a fluid character.
    a. Ground substance
    b. Collagen
    c. Integrins
    d. Compression

3. When stretched abruptly or for an extended period, fascia __________, actively contracting against the stretch.
    a. Decreases resistance
    b. Increases resistance
    c. Loosens
    d. Thickens

4. __________describes the character of a structure, the integrity of which depends on balanced tension across its rigid parts.
    a. Dysfunction
    b. Strain
    c. Tensegrity
    d. Viscosity

5. Which of the following is a primary contributing factor in the development of myofascial restrictions?
    a. Mechanical overload
    b. Poor posture
    c. Poor diet
    d. Chronic tension

6. Where muscles are short and tight, the myofascia is likely to:
    a. Be bulky, fluid filled, and adhered to the affected muscles and surrounding tissues in the shortened position
    b. Weave itself around the affected joint causing shortened, tight areas
    c. Stretched, flat, dehydrated, and adhered in a strap-like form to muscles and surrounding tissues in the shortened position
    d. Support opposing ranges of motion

7. Myofascial restriction is indicated by:
    a. An ability of a superficial structure, such as skin, to glide smoothly over a deeper structure, such as muscle
    b. Acute trauma in the area confirmed by an MRI
    c. An area, when compressed, that refers pain and/or tingling to another area in the surrounding tissues or in the body
    d. An inability of a superficial structure, such as skin, to glide smoothly over a deeper structure, such as muscle

8. __________is/are a good assessment tool for deeper myofascial restrictions and an excellent tool for releasing them.
    a. Tapotement
    b. Skin rolling
    c. Stretching
    d. Slow, cross-fiber strokes

9. During your assessment and treatment, the client may report feeling sensations of:
    a. Hunger or thirst
    b. Numbness, tingling, hot, or cold
    c. Restlessness and anxiety
    d. Burning, itching, scratching, or pinpricks

This completes the Understanding Myofascial Restrictions exam. Proceed to the next page to view the text.

FASCIA

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FASCIA

UNDERSTANDING FASCIA

Fascia is one of the most studied structures in the human body today. It became so significant in scientific literature worldwide that in 2007 the International Fascia Research Congress (http://www.fasciacongress.org/) was established to explore the importance of fascia for both conventional and complementary health care. Previously thought to be a passive connective tissue, research has established biomechanical and adaptive properties of fascia that are becoming widely recognized as an integral part of homeostasis and an essential element in the long-term resolution of many chronic conditions.

Fascia is soft, loose or dense, fibrous connective tissue forming a continuous, three-dimensional matrix that provides support and shock absorption for the structures of the body; communicates vital information about tension and compression throughout the body; and facilitates the absorption of nutrients and removal of toxins and metabolites (Fig. 1). Fascial fibers form loose or dense, regular and irregular connective tissue with a multidirectional arrangement (Fig. 2). Fascia covers all of our organs, nerves, muscles, and bones, and while it separates one structure from another, its continuous matrix also connects the structures of the body.

Figure 1. Fascia surrounds our organs, nerves, muscles, and bones. The areas in white represent regions of thick fascia.

Figure 2. Dense irregular connective tissue. Photo copyright Ronald A. Thompson, Ida P. Rolf Research Foundation; used by permission.

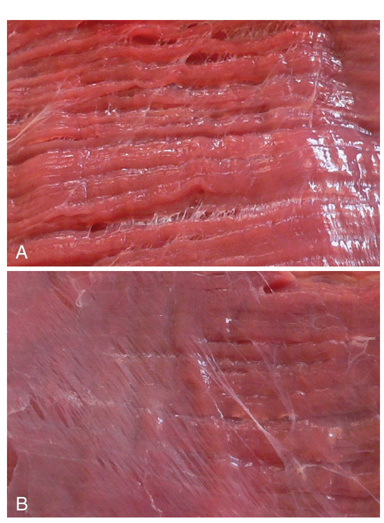

Figure 3. The fascial web weaves between muscle fibers (A) and surrounds groups of fibers (B). Photos provided courtesy of www.terrarosa.com.au.

There are three types of fasciae. Superficial fascia, or subcutaneous fascia, is just beneath the skin. It is composed largely of loose, irregular connective tissue and adipose tissue. It connects the skin to the superficial muscles and supports the superficial nerves and blood vessels. Superficial fascia stores water and fat, which help insulate the body. Deep fascia is denser than superficial fascia and covers the muscles (myofascia) and viscera, and forms aponeuroses, ligaments and tendons. It binds the individual fibers that form single muscles and connects individual muscles into groups. The types of collagen and concentrations of elastin change as myofascia reorganizes within the continuous matrix to form the denser tendons, which attach muscle to bone, and ligaments, which support the bones that form a joint. Healthy myofascia allows muscles to move independently and holds nerves and blood vessels that supply structures deep to the skin. Visceral fasciae form the sacs that hold our organs within their cavities and are named according to the organ they support: pericardia (heart), pleura (lungs), and peritonea (abdomen).

While fascia has different forms and functions depending on its location, it is all integrated into a single, continuous, three-dimensional matrix. Massage therapy often focuses on the actions of individual muscles or muscle groups for the purpose of assessing dysfunction and planning treatment. However, because they are bound together, when we assess and treat muscles, we are also necessarily assessing and treating fascia. Every muscle functions within the fascial web (Fig. 3). Thus, when we are successful in relaxing a muscle in spasm, the restoration of its normal resting length is unlikely if the fascia surrounding it is bound and shortened. For this reason, understanding the structure and function of fascia can have profound implications for treatment outcomes.

Fascia primarily comprises ground substance, collagen, and elastin. Ground substance—resembling a thin or diluted gel—gives fascia a fluid character. Ground substance holds cells together and allows for the exchange of substances between cells and the interstitial fluid that bathes them, letting nutrients in and metabolites and toxins out. Ground substance can change in density according to the tissue's needs—a characteristic referred to as thixotropy. Movement, heat, and hydration keep it fluid, and this fluidity in muscles allows for freer movement. Lack of movement, cold, and dehydration cause it to thicken, and thickening inhibits free movement. This is much like what happens to a can of paint. When left alone, particularly in a cool environment, the paint becomes thicker and less mobile. Stir it up, and it begins to liquefy. During the initial healing stage of an acute injury, restricted movement may help prevent re-injury. However, in the subacute and chronic stages, or when a chronic dysfunctional pattern results from postural imbalance, fascia becomes tight and bound, and the thicker, more viscous ground substance is less effective in exchanging substances. Fewer nutrients make it into the cells, and metabolites and toxins are more likely to accumulate locally. Reducing the viscosity of ground substance is one of the goals of myofascial massage. Shearing forces, as applied in many massage strokes, reduce viscosity.

Collagen, a protein that easily binds and forms fibers or threads, gives fascia its strength and resilience. Many different types of collagen are found in the human body, each contributing slightly differently to the capabilities of the tissues it forms. The combinations and concentrations of these different collagen fibers allow for the wide variation of connective structures in the body. Collagen makes fascia highly resistant to overstretching and tearing. However, because collagen fibers are so prone to binding, when dysfunction begins, collagen plays a key role in the development of adhesions and is the main component of scars. Elastin—another protein—makes fascia flexible and stretchy, allowing it to reshape as the body moves in every possible direction. When movement allows fascia to stretch slowly, these changes are gradual and fluid. However, when dysfunction puts fascia in a constant stretch, it lengthens and cannot recoil as muscles do. As it stretches, it loses fluid and becomes rigid, dehydrated, and adhered. In time, with proper healing that includes reducing adhesions, restoring the fluidity of ground substance, and removing the offending action or posture, new fibers can form to reestablish the fascia's strength and elasticity.

Fascia is also packed with integrins—receptors that detect tension and compression outside the cells they surround and then communicate this information directly into those cells. This gives fascia the remarkable ability to adapt and instruct the cells it covers to adapt to the body's needs at any given time. Under strain, the primary cells of fascia, called fibroblasts, secrete cytokines, which are immune-responsive substances that encourage inflammation. This suggests that fascia has immunological properties. Cytokines are also communicative. When functioning optimally, these communicative properties of fascia encourage adaptation and healing of the injured structures it is connected to. However, when integrins are overloaded and fibroblasts become hyperactive, the once adaptive response can become chronic and pathological. Recent studies have explored the hyperactive inflammatory response as a factor contributing to fibromyalgia.

Fascia is also embedded with smooth muscle cells that aid in its adaptation to tension and the demands of the structures it surrounds. When stretched abruptly or for an extended period, fascia increases resistance, actively contracting against the stretch. This may explain the increased tone and fibrotic texture of stretched fascial tissue. Fascia is thoroughly innervated by mechanoreceptors such as Golgi receptors, Ruffini and Pacini corpuscles, and minuscule nerve endings, providing both sensory and motor functions that serve as receptors for pain as well as tension and pressure. Deliberate pressure, whether slow and steady or fast and variable, stimulates these individual receptors. This initiates a cascade of changes in autonomic functions that range from local changes in viscosity and metabolism to more systemic adaptations such as muscle relaxation and emotional calming, depending on the receptor's functions. This may explain why myofascial release to one area of the body can have profound healing effects in distant areas and why treating dysfunctional fascia can be an effective way of restoring healthy muscle tone.

Myofascial dysfunctions tend to follow patterns along what are referred to as myofascial lines (also called myofascial meridians), described in detail in Thomas Myers' (2008) *Anatomy Trains*. These lines are tracks of myofascia within the matrix, which support the common lines of pull (muscle actions) along which strain and tension are transmitted through the body to move the skeleton. These lines of fascia continue past the insertion of a single muscle, linking it to structures that experience tensile stress in similar directions. For example, a myofascial line links the plantar muscles to the calf muscles, hamstrings, gluteals, erector spinae, and suboccipitals all the way up to the galea aponeurotica. Local strain at any point along that line may be transmitted along the whole line, often producing symptoms and dysfunction somewhere other than at the original site of strain.

To understand myofascial lines and the tendency of dysfunctional patterns to develop along them, we must first understand the concept of tensegrity. Tensegrity (tensional integrity) describes the character of a structure, the integrity of which depends on balanced tension across its rigid parts (Fig. 4). Tension in one part of the structure must be balanced by tension in another. In the human body, the rigid parts are our bones. By themselves, the bones would simply stack upon each other, compressed by gravity, eventually collapsing under their own weight. The skeleton is stabilized by the constant tension of muscles, tendons, and ligaments—our tensile structures. And

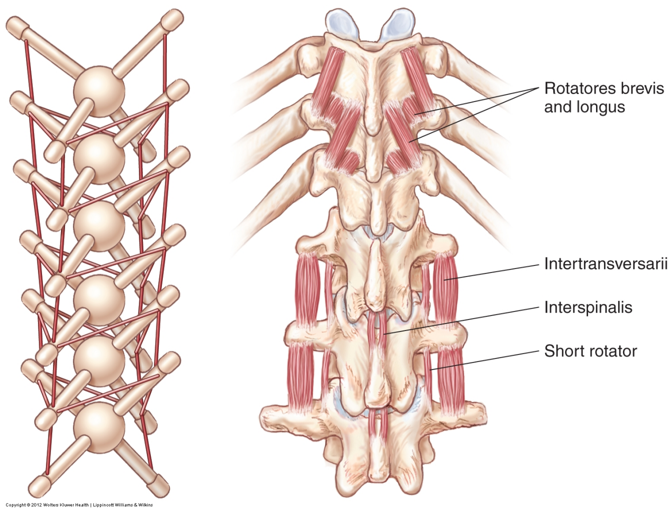

Figure 4. A tensegrity structure depends on balanced tension across its rigid parts. The stellated tetrahedron on the left and the spine on the right are flexible yet stable structures.

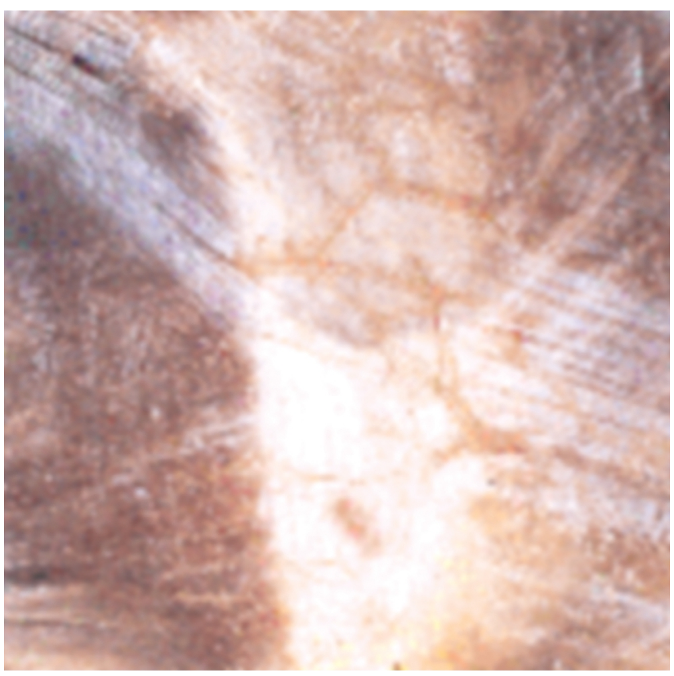

Figure 5. Pectoral fascia under stress. Myofascial fibers of this pectoralis major have reorganized diagonally, from upper left to lower right, stiffening along the direction of applied stress. Photo copyright Ronald A. Thompson, Ida P. Rolf Research Foundation; used by permission.

fascia, which binds these structures, distributes tensile stress throughout its webbing to prevent any single, localized area from being subject to the full force of a movement or gravity.

When stress to one part of a structure is increased, especially when the stress is repetitive, myofascial fibers reorganize and stiffen along the direction of applied stress (Fig. 5). Under maximum strain, as when chronically lengthened, this alignment of fibers can become virtually linear, losing the multidirectional character that allows for remarkable freedom of movement and resilience against stressors. This is much like what happens when you pull the ends of a cotton ball. In a relaxed state, the fibers of a cotton ball are arranged in multiple directions, like a loosely knit mesh. When you slowly pull the ends, you can see the fibers straighten and reorganize along the line of the stress (stretch) you are applying. As you continue to pull, most of the fibers reorganize into this longitudinal alignment. The rigidity of those aligned fibers provides protection against the stress you are applying (you have to pull with more force to lengthen them further), and makes the fibers more efficient against stress aligned in that direction (as when cotton is spun into yarn or thread). However, when aligned to accommodate stress in a single direction, the fibers also lose the freedom of random movement. Conversely, if you squeeze a cotton ball tightly, its fibers become compressed, changing the density of the once fluffy ball. To restore its fluff, you would loosen the fibers slowly and gently, uncrimping the densely packed fibers and increasing the spaces between them.

When one area of the body is repeatedly subject to a pattern of tension or stress in the same direction, the muscles that contract in that direction often shorten and their antagonists lengthen. The fascial webbing surrounding those structures follows, becoming short, thick, and compressed or long, narrow, and stretched. In either case, function is compromised, restricting movement and reducing pliability. If the local fascia loses function within the tensegrity model, stress is distributed along the fascial line that contains that structure to compensate for the weakness. Left untreated, tensegrity along that line falls out of balance. Ultimately, adhesions, hypertonicity, trigger points, and chronic pain syndromes may develop.

For example, a client with hyperlordosis often presents with shortened hip flexors and lumbar extensors and lengthened hamstrings and abdominal muscles. The fascia surrounding the shortened soft tissues bunches up and becomes dense and bound to the shortened muscles and other local structures. This fascia needs to be released and lengthened to restore free movement of each structure individually and to allow the muscles to regain a normal resting length and tone. The fascia surrounding the lengthened structures stretches, with fibers aligning virtually linearly in the direction of tension, and creates a belt-like band that binds to the surrounding soft tissues. That band of virtually unidirectional fibers initially serves to prevent tearing and to protect the structure from more dramatic misalignment, but in doing so, it restricts free and random movement, ultimately weakening the structure. In both cases, adhesions and compromised function affect the circulation of fluids that feed the soft tissues and remove toxins and metabolites. Toxins accumulate; nutrition is diminished; function is compromised; and trigger points, pain, and weakness develop. Since a tensegrity structure distributes stress along the direction of tension, such dysfunction can occur anywhere distant from the site of strain along the line of tension.

The remainder of this lesson focuses on myofascia, with particular attention to its superficial layers, its contribution to chronic pain, and the role massage therapy can play in restoring proper function. However, untreated fascial restrictions can have a profound effect not only on the function of the musculoskeletal system but also on any organ within all systems of the body. Applying myofascial release to treat structures other than the musculoskeletal anatomy requires advanced training in myofascial release. The References and Selected

Readings section at the end of this lesson includes articles with more clinical detail than presented here, and many continuing education offerings focus on the finer details of fascial health and homeostasis.

Possible Causes and Contributing Factors

Mechanical overload, whether caused by an acute incident, repetitive misuse, or postural imbalance, is a primary contributing factor in the development of myofascial restrictions. Immobility following an injury or as a result of static postures held for long periods may also cause the thickening of ground substance, which contributes to myofascial adhesions and compromises the exchange of nutrients and waste products. Daily exercise reduces the risk of developing broad myofascial restrictions, and studies have shown that injuries heal better when activity is reintroduced as soon as possible. Chilling the fascia, whether directly—such as with prolonged use of an ice pack—or indirectly—such as when sitting near an air conditioning vent, may also cause a thickening of ground substance, reducing fascial mobility and its ability to transfer nutrients and metabolites. Prolonged compression of myofascia by external sources, such as the straps of a bag or a utility belt, may reduce fluid content and contribute to adhesions.

Scar formation binds fibers together and increases adhesions. In the initial 24–48 hours following injury, the inflammatory process aids in providing nutrients and clearing the area to promote healing. Fibroblasts become very active, producing ground substance and collagen to reestablish integrity in the injured structure. These fibers are laid down more randomly than when fibroblasts actively restore and reinforce healthy tissue. As the scar matures, the collagen fibers bind tightly and harden to prevent further damage from tensile stress. Untreated, scar tissue shrinks and tightens, ground substance diminishes, adhesions solidify, and both the structure and function of the injured tissue are compromised. The period of scar tissue maturation is an ideal time to apply myofascial techniques to soften and reorient fibers, reduce local adhesions, and minimize the risk of spreading dysfunction throughout the matrix.

Pathologies including chronic inflammation, infection, hormonal imbalance, and nutritional deficiencies can also affect the normal functioning of fascia, though dysfunction may not be apparent until weeks, months, or even years later. Trauma, fatigue, and physical or emotional stress can perpetuate myofascial dysfunction. Congenital conditions such as bone length discrepancies may encourage compensatory patterns that include myofascial restrictions.

Many conditions you encounter will likely involve myofascial restrictions because the postures or traumas that contribute to these conditions can also contribute to tensile stress and adhesions. Releasing myofascial restrictions that contribute to these conditions is necessary to fully resolve the signs and symptoms associated with them.

Contraindications and Special Considerations

First, it is essential to understand the cause of the client's pain. Refer the client to his or her health care provider if symptoms are severe or significantly reduce his or her activities of daily living. These are a few general cautions:

- **Infection.** Fascial restrictions can be associated with chronic infections that cause inflammation. Massage is systemically contraindicated until the infection is resolved.
- **Acute injury.** Do not treat local to an acute injury. Performed without advanced training, myofascial release may be too aggressive for newly injured tissues. Wait until the subacute or chronic stage, when the tissues are more stable.
- **Producing symptoms.** Take care to keep the level of pain within the client's tolerance. Explain the process of treatment and the sensations your client may experience before you begin so that the client is aware and prepared. Understanding may keep the client from tensing up.
- **Hypermobile joints and overstretched muscles.** It is best not to fully stretch a muscle or fascia that is already lengthened or crosses a hypermobile joint. Fascial restrictions found in such areas should be treated with strokes that bring the joints on either end of the stretched fascia closer together, releasing only the affected fibers.
- **Treatment duration and pressure.** If the client is elderly, has degenerative disease, or has been diagnosed with a condition that diminishes activities of daily living, you may need to adjust your pressure as well as the treatment duration. More frequent, half-hour sessions may suit the client better.
- **Friction.** Do not use deep friction if the underlying tissue is at risk for rupture. To avoid re-injury, allow time for scarring and tissue regeneration before applying friction. Do not use deep friction if the client is taking anti-inflammatory medication or anticoagulants. Friction initiates an inflammatory process, which may interfere with the intended action of anti-inflammatory medication. Recommend that the client refrain from taking such medication for several hours before treatment if his or her health care provider is in agreement. Because anticoagulants reduce clotting, avoid techniques that may cause tearing and bleeding.

CLIENT ASSESSMENT

It is always essential to learn as much as you can about the client's health history before proceeding with any type of massage. Many conditions may have underlying contributing factors—such as systemic conditions, past trauma, side effects from medication, and personal stress—that involve contraindications or require special consideration in a treatment plan. It is important to get as much detail as you can and use critical thinking to see the big picture.

Health History

OLDRFICARA (read: "Ol' Dr. Ficara") is a mnemonic to help you remember important questions to ask the client when collecting the basic, subjective information you need to make an accurate assessment and plan treatment. The answers to these questions may have different implications depending on the client's condition. These are discussed in greater detail in the chapters on specific conditions.

Onset—When did the symptoms begin?
Location—Where are the symptoms felt?
Duration—How long do the symptoms last when they occur?
Radiation—Do the symptoms radiate to another part of the body?
Frequency—How often do the symptoms occur?
Intensity—Using a pain scale, what is the level of pain with these symptoms?
Character—Describe what the symptoms feel like.
Aggravating factors—What makes the symptoms worse?
Relieving factors—What makes the symptoms diminish?
Associated factors—This includes more specific questions based on the information you have collected so far and questions about any medical diagnoses, medications, other treatments, past injuries, and any other detail that may help you plan treatment.

What do Signs and Symptoms Tell You?

A client's signs and symptoms can tell you much of what you need to know to assess a mild or moderate condition. Signs are objective and measurable by the therapist. These include postural deviations, ROM assessment, tone, temperature, and texture of soft tissues. Symptoms are subjective and are measured by the client. These include level of pain, fatigue, and quality of life. Knowing what a client feels before beginning a postural assessment or special tests helps you focus your assessment and save time. While each client's case and subjective description may vary, some general interpretations of signs and symptoms listed in Table 1 can be helpful.

Table 1. General Interpretations of Subjective Descriptions

Subjective Description	During Activities of Daily Living	During Palpation or Treatment
Sharp pain	Recent trauma to soft tissue. Acute stage of an injury, such as torn muscle fibers, tendon, or ligament, felt particularly with movement, often relieved at rest. A condition involving an internal organ (local, deep pain). Compression or impingement of a nerve, in particular if accompanied by burning or tingling, felt at rest or with activity.	Compression of or friction to torn fibers. Compression of a bone spur, cyst, or other abnormal growth. An internal organ condition, when working on the abdomen.
Dull, aching pain, or stiffness or tightness	Trauma to the muscle in the nonacute stage. Hypertonicity. Swelling. Myofascial or joint restriction. Active trigger point. Syndrome such as fibromyalgia.	Ischemia due to the client's posture during treatment or to the technique applied. Area of accumulated metabolites. Hypertonic or fatigued muscles.
Burning pain or sensation	Compression of a nerve. Cutaneous trigger point. Damage to periosteum (local sensation).	Compression of a nerve due to the client's posture during treatment or to the technique applied.
Tingling or numbness	Nerve compression, impingement, or lesion. Holding the same posture for a long period. Ischemia. Systemic medical conditions involving nerve damage or ischemia (e.g., diabetes). Vitamin or mineral imbalance. Toxic exposure. Side effect of radiation.	Ischemia or compression of a nerve due to the client's posture during treatment or to the technique applied.
Throbbing pain	Inflammation. Acute injury. Sluggish venous or lymphatic flow.	Prolonged compression of blood vessels.
Increasing pain on movement	Active trigger point. Spasm. Torn fibers. With radiating pain, irritation of a nerve.	Active trigger point. Spasm. Torn fibers. With radiating pain, irritation of a nerve.
Decreasing pain on movement	Edema or decreased circulation relieved by increasing circulation. Latent trigger point.	Edema or decreased circulation relieved by increasing circulation. Latent trigger point.
Pain unaffected by movement	Cutaneous trigger point. Pain is referred.	Cutaneous trigger point. Pain is referred.

Weakness	Injury or condition affecting nerves, muscles, or neuromuscular junction.	Compression of a nerve or blood vessel due to the client's posture or the therapist's technique.
Paresthesia (prickling, itching, pins and needles sensation on skin)	Nerve involvement ranging from simple compression to tumors. Compromised circulation. Diabetes. Hypothyroid condition. Vitamin deficiency. Rheumatoid arthritis. Lupus.	Compression of a nerve. Stimulation of cutaneous reflex zone.
Hyperesthesia (abnormally high sensitivity to stimulus)	Chemical stimulants (e.g., caffeine). Trauma to head or spinal cord. Anxiety.	Stimulation of the central nervous system. Anxiety.
Heat	Inflammation.	Increased circulation resulting from repetitive stroking. Technique initiates inflammatory process.
Cold	Ischemia.	Compression of blood vessels.

Use a pain scale when assessing the client's symptoms. Research some of the many methods used to assess pain, and choose one that helps you make the best connections between the client's subjective description and treatment goals. Always remember that pain is subjective and that clients' pain tolerance may vary widely. In your verbal assessment, ask the client about their level of pain during activities of daily living. A scale of 1-10 is commonly used where 10 represents a level of pain that significantly hinders or even prevents activities of daily living. A level 9 or 10 pain during activities of daily living may indicate a serious condition or a severe or acute injury. Refer these clients to their health care provider if you suspect a systemic condition or if the injury requires medical attention. In the case of a severe or acute injury that is not contraindicated for massage, even if you have received clearance from a health care provider to perform massage therapy, you may not be able to work locally, and you should not work deeply. You may opt to reschedule treatment of this client until the injury has reached the subacute or chronic stage, or refer the client to a massage therapist with advanced training. Note that all pain matters; do not underestimate the importance of even a level 2 or 3 pain, especially if it is chronic. A healthy neuromusculoskeletal system should produce no pain at all.

You also need to assess any pain a client experiences during treatment. Using a 1-10 scale again, 10 represents pain that would cause the client to pull away from your touch. Ask the client to let you know when you approach level 6 or 7, because once pain reaches a level 8, the client may not be able to remain fully relaxed. If you are going to use a technique that produces pain above a level 8, such as some trigger point techniques, explain this to the client in advance to try to keep him or her from tensing the muscles. Many clients believe that treatment is most beneficial when it is deep and painful. Explain to your clients that treatment is most effective when it is delivered slowly and deliberately, one layer at a time, with the client as relaxed as possible. The treatments described in this text should not be painful. Keeping the client calm and relaxed is crucial. Reminding the client to breathe during deep techniques may help ease pain and prevent him or her from tensing the muscles.

Range of Motion Assessment

When testing ROM to assess a dysfunction, it is best to test active ROM of the joint first. The client will likely restrict active free ROM (AF ROM) to a range within their comfort zone. Use the client's active range as a guide when performing passive ROM and resisted ROM testing to avoid causing the client unnecessary pain or further injury by moving beyond their comfort range. Moreover, forcing joint movement through its full range can affect the accuracy of your assessment. You want to assess what the client can achieve only up to the point of discomfort. This will give you the information you need to assess what may be keeping the client from reaching the full range. When using ROM as part of your treatment or recommending it for self-care, be careful to stay within a comfortable range and to limit resistance or repetition that may reproduce symptoms.

As an assessment tool, AF ROM gives you information about both contractile and non-contractile tissues in and surrounding the joint. If the AF ROM of the affected joint causes pain or is reduced compared to the same, healthy joint on the other side of the body, this could indicate trigger points, adhesions, scarring, or injuries to the agonist, synergist, or antagonist for that movement as well as possible abnormalities in bone, ligaments, bursa, menisci, or other tissues. If the client feels no pain but is unable to move the joint through its full range, this could indicate weakness in the agonist or synergists of that motion and may indicate neurological involvement. Such results should lead you to test those muscles more specifically either with resisted ROM to test strength or with palpation to test texture, tone, temperature, and tenderness.

As an assessment tool, passive ROM may reveal information about joint dysfunction that is unrelated to muscle contraction. By eliminating muscle contraction as a factor in this assessment, you may be able to deduce that pain or restriction is caused by injury or inflammation that is not wholly muscular in nature. Bursitis, meniscal tears, bone spurs, ligament instability, dislocations, fascial restrictions, or other problems may then become evident.

End feel is the term for the sensation the therapist feels when applying overpressure, that is, adding just a bit of pressure at the end of the client's comfortable passive range of motion. You add only enough pressure to feel if and how the joint springs back. You do not want to add enough pressure to push the joint beyond the client's comfortable ROM. A healthy end feel is one that occurs when overpressure is added to the P ROM of a joint that has full ROM and results in a gentle spring back with no discomfort. This is the normal response to overpressure when the shape of the joint and functional soft tissue surrounding the joint are the only things that limit its range. A pathological end feel, in contrast, is the sensation you feel when overpressure is added to the passive ROM of a joint that cannot reach full ROM or results in discomfort because an unhealthy structure stops it short. Table 2 summarizes healthy and pathological end feels.

Table 2. Joint End Feel

Type of End Feel	Cause of Limitation	Healthy End Feel	Pathological End Feel
Soft tissue approximation	Normal mass of soft tissue at end of range (e.g., elbow flexion is limited by meeting of biceps and anterior forearm muscles).	Painless for client. Therapist feels soft compression of one muscle against another with spring back following overpressure.	N/A
Muscle end feel	Full length of muscle reached (e.g., dorsiflexion is limited by the length of plantar flexors).	Client feels stretch. Therapist feels tension and spring back following overpressure.	Client may feel pain if adhesions or scarring are present. Therapist feels abrupt end of range.
Capsular end feel	Joint capsule reaches full stretch (e.g., external rotation of shoulder).	Painless for client. Therapist feels firm sensation with little give as if stretching leather, with spring back following overpressure.	Soft capsular end feel is similar to healthy end feel, but client feels pain and muscle guarding. Common with sprains, acute inflammation, and stiffness, and felt throughout range. Hard capsular end feel ends in resistance and no give.
Ligamentous end feel	Ligaments surrounding joint (e.g., abduction of extended knee).	Client feels no pain. Therapist feels firm end with no give, and spring back following overpressure.	Referred to as loose ligamentous end feel. Client may feel pain. Therapist is able to move joint beyond normal range.
Bony end feel	Bony structures of joint (e.g., full extension of knee).	Client feels no pain. Therapist feels abrupt end of range with spring back following overpressure.	Client may feel pain. Therapist feels abrupt, hard stop before full range due to callus, fracture, or myositis ossificans. An end feel that is rough or gravelly may indicate chondromalacia or crepitus.
Muscle spasm	Reflexive muscle spasm to prevent further movement.	N/A	Client feels pain and stops movement suddenly with possible rebound due to spasm.
Boggy end feel	Joint effusion or edema (common with sprains and capsular restrictions).	N/A	Client may feel pain. Therapist feels soft, mushy end.
Empty end feel	Severe pain. Rare except with grade 3 sprain, impingement, dislocation, acute bursitis, or tumor.	N/A	Client feels severe pain. Therapist feels no restriction or no appreciable end to range, but movement is protectively stopped by client, without spasm, as contraction would cause compression and increase pain.

As an assessment tool, R ROM can give you information about the client's strength and the health of the nerves that send impulses to the muscles that move the joint being tested. If R ROM tests elicit pain, it is likely that there is a trigger point or a strain to the muscle or tendon crossing the joint. Depending on the degree of strain, the results may be similar to AF ROM. If R ROM reveals weakness without pain, nerves may be involved.

Palpation

Your fingers have many sensory receptors that give you the ability to detect even the most minor inconsistencies in tissues. While developing palpation skills, be patient with yourself. You may not yet be fully able to quickly make the connections between what you read here and what you feel with your hands. It takes time and practice with many different bodies to develop accurate palpation skills.

Many of the strokes used at the beginning of treatments are excellent palpation tools that can reveal atypical properties, such as hypertonicity, in a general way. With the more local tissues involved in specific conditions, it is important to take your time with palpation for your assessment to be comprehensive and accurate. When palpating locally for specific irregularities like scar tissue or strains, your movement should cover only 1 inch of tissue in 5-10 seconds. Slow, deliberate palpation in an area solid with adhesions and hypertonicity may also release superficial tissues and reveal deeper, more specific causes of dysfunction. Focus intently when you palpate to avoid missing subtle details. Begin superficially and work toward deeper palpation. Even when palpating deep tissues, avoid heavy pressure that may change the texture of the surrounding tissues, transfer too much information to the receptors in your fingers, and obscure your results. Ease your way into the deeper layers.

Focused palpation reveals inconsistencies in the texture, tone, temperature, and tenderness of tissues that might help explain the causes of dysfunction and pain. The norms for these characteristics may differ slightly from client to client, so you need to palpate bilaterally to make a comparison between tissues that you suspect are contributing to poor posture or pain and the tissue of the same structure on the unaffected side. Table 3 is a general guide to some of the characteristics you may discover.

Table 3. Common Characteristics of Injured Tissue

Characteristics	How it Feels to the Therapist	Therapeutic Goals
Adhesions tissues stick together	Superficially, it may feel as if the skin does not move freely over superficial muscles. Deeper structures may feel as if they are one. You may be unable to differentiate individual muscles or fiber directions if adhesions are present.	Release adhesion to allow tissues to move freely and independently.
Hypertonicity increased tone in muscle belly, often accompanied by dehydration, and may be neurological in nature.	Tissue feels resistant and harder than healthy tissue. Shape is distorted. Fiber direction may be obscured. Often accompanied by adhesions and may contain trigger points.	Reduce tone—release tension with heat, massage, and lengthening.
Hypotonicity reduced tone in muscle belly, often accompanied by fluid retention, and may be neurological in nature.	Tissue feels spongy and softer than healthy tissue. Fibers may feel inflated. Contractile strength may be reduced but functional.	When indicated, increase tone with cold, stimulating strokes, and isolated concentric contractions.
Atrophy muscle wasting, often the result of a systemic condition or lack of use.	Tissue feels spongy and softer than healthy tissue. Contractile strength is minimal to nonexistent.	Treatment depends on the cause. If systemic, discuss with health care professional. If disuse is the cause, perform isolated contractions with gradual introduction of resistance.
Taut overstretched or pulled tightly.	Tissues feel like tightly pulled strings, as on a guitar. Fibers are easily isolated and may strum when applying cross-fiber strokes. Often accompanied by adhesions and may contain trigger points.	Reduce adhesions and trigger points if found. Encourage activities and postures that do not add length to the muscle.
Myofascial trigger points hyperirritable spot in a taut band of skeletal muscle.	When palpable, feels like a knot or a bump. Trigger points are often obscured by adhesions and hypertonicity and are revealed only when superficial layers are treated first.	Reduce tone, metabolites, ischemia, or other factors contributing to trigger points, followed by stretching to restore normal muscle length.

Scar tissue	An interruption in fiber direction or an uncharacteristic, immovable bump or divot in tissue with accompanying adhesions.	Break up scar tissue, and realign with healthy fiber direction.
Fibrosis formation of tough, fibrous tissue; often part of the healing process but can become chronic.	Thick, often lumpy, moveable tissue. Sometimes feels as if fibers are inflated or swollen.	Halt fibrous formation by increasing circulation and restoring muscle function. In chronic cases, use friction to reduce nodules when not contraindicated (e.g., with rheumatoid arthritis) followed by stretching the affected fibers.
Panniculosis fibrosis or increased viscosity of subcutaneous fascia.	Superficial. Feels coarse and granular. Skin may look dimpled.	Skin rolling or other myofascial technique to reduce viscosity.
Crepitus crackling sound made when two rough surfaces in the body make contact.	Feels similar to adhesion but with audible and palpable crackling.	Reduce adhesions and release gasses or metabolites that contribute to crepitus. Increase circulation to flush tissues.
Inflammation local response to injured cells characterized by dilation of capillaries, heat, and swelling.	Local, sometimes visible swelling that is often red and warm or hot to the touch.	Massage is locally contraindicated when inflammation is acute. Increase venous flow proximally to encourage removal of metabolites.
Edema accumulation of interstitial fluid.	Skin may look swollen, stretched, or shiny. Texture may feel boggy or gelatinous.	Massage is locally contraindicated. Increase venous and lymphatic flow proximally to encourage reabsorption.
Heat dilation of blood vessels, often red, and a sign of inflammation.	Warm or hot to the touch.	Heat may be a sign of infection, which is a contraindication. If no infection is suspected, encourage venous return and lymphatic flow.
Cold constriction of blood vessels, often pale and dry, and may result in reduced hair growth.	Cool or cold to the touch.	Cold may be a sign of ischemia and may result from a systemic condition. If no contraindications exist, increase circulation to warm the area.

ASSESSING AND TREATING MYOFASCIA

Figure 6. Treat myofascial tissues in the direction that you want the structure to move.

Figure 7. Skin rolling.

Figure 8. Orange peel texture.

Pain and reduced ROM resulting from musculoskeletal injury or postural imbalances will almost certainly involve some degree of myofascial dysfunction. A client will not likely complain specifically about fascial restrictions but will likely refer to a general or specific area of pain or tension. If your client has been evaluated by a health care professional to rule out more serious contributing factors and has had a variety of treatments targeting muscles but continues to experience pain, fascial restrictions may be preventing the return of normal resting length and tone. In general, where muscles are short and tight, the myofascia is likely to be bulky, fluid filled, and adhered to the affected muscles and surrounding tissues in the shortened position. Where muscles are lengthened and weak, the myofascia will likely be stretched, flat, narrow, dehydrated, and adhered in the long, strap-like form.

As a general rule, you want to move fascia in the direction that you want the affected structure to move. For example, if the pectoral fascia is bound in the shortened position due to internal rotation of the shoulder, lengthen the pectoral fascia from the clavicle and sternum toward the humerus to encourage external rotation. If the fascia of the upper back is stretched along with the erector spinae due to an increased curve of the thoracic spine, move the fascia inferiorly to help reduce the kyphosis (Fig. 6). Take care not to use techniques that stretch fascia that is already lengthened due to injury or postural imbalance.

Once you have completed a postural assessment that helps indicate which structures may be contributing to the client's symptoms, palpation will give you the most direct and accurate picture of the client's myofascial health. One key to accurate palpatory assessment is distinguishing between muscle fibers and fascia and recognizing the musculotendinous junctions where fascia tends to be thickest. Density and mobility will provide clues. Hypertonic muscle fibers feel broadly dense, knotty, or crunchy but can usually be identified individually. Apply pressure to a hypertonic muscle until you feel resistance, and as it releases, you can palpate more deeply before you feel the next level of resistance. Fascial restrictions require more focused assessment. A hand that is too heavy may push past the superficial fascia, and you might miss those restrictions. Moreover, myofascial restrictions can be small and localized and easily passed by if you are not focused. A myofascial restriction will slow or even stop your stroke if you move along it slowly and intently.

It is best to assess and treat myofascial restrictions before applying emollient to prevent gliding over the restrictions. Check the skin, muscles, attachment sites, and any ligaments in the area for immobility and adhesions. Assess the texture, temperature, tone, and tenderness of the tissues in the affected areas as well as distant structures known to contribute to pain in those areas. Restriction is indicated by an inability of a superficial structure, such as skin, to glide smoothly over a deeper structure, such as muscle. Cross fiber strokes are an effective way of initially breaking up adhesions and increasing space between structures or fibers. Skin rolling is an excellent technique for both assessing and treating superficial myofascia (Fig. 7). Using both hands, grasp a piece of skin between your thumbs and the index and middle fingers, and gently push the skin away from you with your thumbs while your fingers walk across the skin to gather and roll it. Begin your roll in an area where tissue is easy to grasp, and move toward the area you suspect to be adhered. Rolling a wad of tissue between your fingers will become more difficult and tender over myofascia that is dense or adhered. The texture of the affected tissue may feel gritty or fibrotic. When gripping the affected superficial tissues, you may see dimpling similar to the texture of orange peel (Fig. 8). Repeating skin rolling several times over the affected area may be sufficient to release restrictions.

Restrictions may also be recognized as tissues that do not spring back after compression or stretching. Gently compress and hook into the tissue and, without gliding, try to move it in all directions. Tissues that do not move freely or do not spring back when released are likely adhered. For a large area of restriction, a

Figure 9. Broad release (A), focused release (B), C strokes (C), and S strokes (D) are all effective methods of releasing myofascial restrictions.

broad stretch is a good beginning (Fig. 9A). Place the flat palms and fingers of both hands over the restricted area. It is helpful to begin with your hands close to, or even touching each other so you can monitor the stretch by watching the space between your hands increase. Without gliding over the skin, move your hands away from each other in the direction you intend to stretch the fascia until you feel movement. For example, if you are reducing restrictions along the latissimus dorsi, begin with your hands over the area of restriction, and move them so that one is moving toward the ilium and the other is moving toward the axilla. Use only enough pressure to make contact with the fascia and move it, without compressing the underlying structures.

If the restriction is more localized, a more focused technique is recommended (Fig 9B). The number of fingers you use depends on the size of the area of the local restriction. Begin with the fingers close to or touching each other so you can monitor the amount of stretch achieved. If you are working deeply, treat the superficial tissues first to ease access to the deeper structures. Use only enough pressure to access and maintain contact with the affected tissues. Without gliding, move your fingers away from each other in the direction you intended to stretch the fascia until you feel movement. For example, if you are releasing an adhesion along the superior fibers of the pectoralis major, place a finger or two of each hand along those fibers. Move the fingers of one hand toward the clavicle, while the others move toward the humerus.

Superficial and deep fascial restrictions can also be released by distorting the shape of the tissue. Use only enough pressure to access the affected tissues. A C-stroke is performed by placing one hand in the area of restriction with the thumb and index finger creating the C shape, while one or two fingers of the other hand push the tissues into the curve of the (Fig. 9C). An S-stroke is performed by placing the thumbs or fingers of one hand parallel to those of the other, and then moving the hands in opposite directions to form the S shape (Fig. 9D).

Figure 10. Assessing and treating deep myofascia.

Assessing deeper tissues requires even more focused palpation. Begin by gently pressing your fingertips at an angle toward the tissues to be assessed (Fig. 10). Once you have entered the area, if you need to work more deeply, adjust the angle of your compression vertically, perpendicular to the target tissue. For example, to access the fibers of the brachialis that are deep to the biceps brachii, enter the area at an angle via the edge of the distal biceps until you make contact with the brachialis. Once you feel it, if you need to gain even more direct access, adjust your angle, approaching perpendicular contact, moving the biceps further out of the way, allowing you to treat the deeper fibers of the brachialis. Move your fingers across a small area of the fibers to release adhesions and along the fibers to lengthen them as necessary.

When assessing the deeper myofascia, feel for independent mobility of each affected muscle, and note the texture of the connective tissues around it. Myofascial restrictions will reduce independent mobility. For example, when you find a taut band of fibers that indicates the possible presence of a trigger point, palpate around the edges of the taut band. You will likely feel a thread of dense connective tissue that not only encapsulates the taut band but also adheres it to the surrounding tissues, preventing these tissues from moving freely and independently. Slow, cross-fiber strokes are a good assessment tool for deeper myofascial restrictions and an excellent tool for releasing them. If you find a deep restriction, maintain contact with it through the superficial layers, and hook and stretch it until you feel release. Follow this with slow, firm longitudinal strokes to lengthen shortened fascia.

During your assessment and treatment, the client may report sensations such as burning, itching, scratching, or pinpricks. These sensations indicate the presence of myofascial restrictions during assessment and the release of myofascial restrictions during treatment. Instruct your client to breathe deeply while you are treating areas that are painful, and take care not to cause a level of pain that keeps the client from relaxing. As the tissues release, the level of discomfort should decrease. The client may report a calming sensation in an area distant from where you are working, which is likely the result of stress being released along the affected fascial lines.

To get the best results, hold a myofascial stretch until you feel the tissue release. This can take up to a minute or longer. Be patient and take care to use only as much pressure as you need to access the affected tissue. These strokes may leave a dent or other distortion in the tissue when you release it. In most cases, this will last for only a few seconds, but in extreme cases, the distorted shape caused by your compression may last longer due to pitting edema. Chronic edema and large areas of pitting edema should be assessed by a medical professional.

MASSAGE THERAPY RESEARCH

What follows is a small sampling of the research describing the effects of massage therapy techniques for the treatment of myofascial dysfunction. The references at the end of this lesson include additional studies, and even those represent only a small sample of the literature on massage treatment for myofascial dysfunction. Several of the following lessos also include references to research in which myofascial release is central to positive outcomes.

In a study titled "Tensegrity Principle in Massage Demonstrated by Electro- and Mechanomyography," Kassolik et al. (2009) tested the electrical and mechanical activities of muscles that are distant from but indirectly connected to the muscles being massaged. Thirty-three men received either a massage to the brachioradialis while the middle deltoid was tested for activity or a massage to the peroneals while the tensor fasciae latae was tested. Although no significant electrical activity was noted in the middle deltoid during the massage of the brachioradialis, electrical activity in the tensor fasciae latae increased with the massage to the peroneals. Mechanical activity increased in both scenarios. The authors conclude that the tensegrity principle applies during the use of massage techniques, an observation that has great implications for the treatment of muscle tension.

LeBauer et al. (2008) produced a case report titled "The Effect of Myofascial Release (MFR) on an Adult with Idiopathic Scoliosis," describing the treatment of an 18-year-old female with significant curves in the thoracic and lumbar spine. Her complaints included low back pain and bilateral hip pain. The subject had worn a brace for approximately 6 months when she was 12 years old and reported that before using the brace she had no pain related to her scoliosis. Posture and gait were assessed, pain was measured using a Visual Analog Scale (VAS), and the subject completed questionnaires assessing her self-reported pulmonary function as well as her quality of life, both before and after MFR. She received 6 weeks of treatment consisting of 45-minute sessions twice per week. Comparison of pre- and post-treatment data revealed improvements in pain, thoracic and lumbar rotation, and posture. VAS, pulmonary function, and quality of life all had significant improvements following MFR. The authors concluded that a single case study cannot confirm that such results are typical and encouraged further investigation of MFR for the treatment of idiopathic scoliosis.

In the case report titled "Efficacy of Myofascial Release Techniques in the Treatment of Primary Raynaud's Phenomenon," Walton (2008) describes the results of the treatment of a 35-year-old female who had been suffering symptoms including pallor and decreased temperature in the extremities due to vasoconstriction, followed by numbness and throbbing pain as blood returned to the extremities for 12 years. Baseline information was collected for 3 weeks before treatment and 3 weeks following treatment. The subject kept a log describing the frequency, duration, and severity of symptoms and the number of digits affected. Five 45-minute myofascial treatments were administered to the upper back, neck, and arms, along the myofascial meridian, over a 3-week period. The duration and severity of symptoms improved over the course of treatment, although the frequency of symptoms and number of digits affected varied little compared to pretreatment measurements. The author notes that while these findings are encouraging, further study including a larger sample size, longer observation period, and a control group is necessary.

PROFESSIONAL GROWTH

Case Study

Maria is a 28-year-old horticulturalist. She is very fit and very flexible. She maintains an active lifestyle, participating in sports and martial arts. She has pain in her right heel.

Subjective
Maria reported feeling intense pain in her right heel, which was constant when she was using the foot. She felt less pain at rest, but it returned with each step throughout the day. She stated that her foot sometimes felt "full" or swollen. She pointed to a spot on the medial, anterior, inferior calcaneus, explaining that at its worst she felt severe pain in that spot, and at times she felt a "buzzing" around the area and up the ankle, a few times reaching the middle of her calf. The pain does not decrease after walking or other activities of the foot. She has no pain in the left foot or elsewhere on the body. Maria stated that until approximately 2 years ago, she had walked primarily on the balls of her feet. After developing chronic low back pain, she had begun a regular, intensive stretching program and began practicing yoga regularly to get her heels to touch the floor, and to reduce the low back pain. She was successful in both, walking flat on her feet without back pain, but had developed a gradually increasing pain in her heel beginning approximately 6 months ago. She has seen her primary care provider and was referred to an orthopedist who then referred her to a podiatrist. X-rays showed no bone spurs or fractures to the bone. All three health care providers diagnosed plantar fasciitis and recommended wearing a boot to prevent plantar flexion when she sleeps. She was unsatisfied with the diagnosis because when she researched plantar fasciitis, she did not think her symptoms matched those in the literature. After practicing all of the recommended self-treatments and exercises, her symptoms were not relieved, and on some days, felt worse. It has become so intense that she has had to discontinue practicing yoga, Hapkido, and working out. She is terribly concerned about being sedentary and is eager to get back to these activities.

Objective
Maria appears healthy and vibrant. When talking about her heel pain, she looks stressed.
A postural assessment revealed head slightly forward, elevated right shoulder, severe hyperlordosis with anterior pelvic tilt, elevated left ilium with slight rotation of the pelvis toward the left. She has a slight valgus of the calcaneus bilaterally. When she lies supine, her non-weight-bearing posture reveals extension of the toes, pes cavus, and significant plantar flexion. The right ankle joint is very flexible; she feels a stretch but no pain with passive dorsiflexion. Palpation produced pain only at the anterior inferior, medial calcaneus, near the attachment of the abductor hallucis, and along the inferior tendons of the tibialis posterior, flexor digitorum longus, and flexor hallucis longus. The fascia of the entire right lower leg is extremely dense and adhered. Compressing the tissues in any area of the leg created significant dimpling, particularly along the superior, medial aspect of the calcaneal tendon. Further palpation revealed fascial restrictions along the whole superficial back line. The fascia is dense and strap-like along the thorax, and slightly tender with skin rolling. The fascia is thick and bound in the thoracolumbar area, surrounding the anterior iliac crest, tensor fasciae latae, and into the iliotibial band. There was a trigger point in the medial, inferior aspect of the soleus, which referred into the heel, reproducing the pain she feels when walking.

Action
Began supine, releasing fascia of the anterior hip and lengthening hip flexors. Maria was able to tolerate only minimal to moderate stretching of this fascia in the beginning. I applied cross-fiber strokes followed by lengthening the hip flexors. I did not treat iliopsoas today because of the time restriction and to avoid combining the intensity of iliopsoas treatment with intense myofascial release. Turning the client prone, I stretched the hip flexors. I performed myofascial release to the full superficial back line. Treatment of the thorax was pleasant for the client, but minimal to moderate stretching of the thoracolumbar fascia caused intense burning and itching. Fascia of the lateral thigh is thick and adhered bilaterally, and myofascial techniques produced intense burning and itching near the iliotibial band. Fascia of the lower leg is particularly thick with much dimpling upon even minimal compression. I focused the majority of my time on broadly loosening the superficial fascia of the legs, progressing to deeper, more specific fascial stretches to the deep tissues of the posterior leg where accessible. Maria felt extreme burning and pinching with a moderate myofascial stretch along the right medial calcaneal fascia. Deeper palpation along the tibia was extremely painful, which raised concerns of medial plantar and tibial nerve involvement, so I worked only superficially in those areas, gently stretching it, and will revisit the area as layers of fascia release. I applied muscle stripping and lengthening strokes to the gastrocnemius and soleus, treating a trigger point in the right soleus. In the initial seconds of compression, Maria stated that the pain intensity had increased from level 6 to 8 and the pressure felt deeper, although I had not increased the pressure I was applying. Over the course of approximately 30 seconds, the pain reduced from level 8 to 4. I applied broad lengthening strokes to the plantar fascia of the right foot, taking care not to reproduce pain in the heel, followed by a deep stretch and post-isometric relaxation to the plantar flexors.
Maria reported feeling looser and freer in movement, although she still feels moderate pain in the heel.

Plan
I demonstrated deep stretches to the hip flexors. If these do not begin to reduce the resting length of the hip flexors, I will treat iliopsoas in subsequent visits. I also demonstrated deep stretches to the plantar flexors and superficial kneading of the iliotibial band. I suggested treatments twice per week with a focus on releasing

thoracolumbar fascia, hip flexors, and plantar flexors. I will reassess for trigger points in the quadratus lumborum, lumbar erector spinae, hip flexors, and deep plantar flexors as superficial tissues release.

Critical Thinking Exercises

Question 1. Become more familiar with the texture of muscle compared to fascia by slowly and gently palpating a few of the large muscles (gastrocnemius, biceps brachii, and rectus femoris) in your partner, with the goal of finding their musculotendinous junctions. Look at photos while you palpate if it helps you locate the junction. When you find it, move an inch toward the muscle belly, then an inch toward the tendon, and identify the differences in tone and texture. Try this on both healthy tissues and those you think may be contributing to your partner's postural deviations or pain. The more sensitive your fingers become to these differences, the more success you will have with identifying fascial restrictions.

Question 2. Begin by finding an area of superficial myofascial restriction on a partner. Place your two index fingers over the restricted area with the fingers as close together as possible. Slowly pull them in opposite directions without gliding on the skin. Watch and feel as the space between your fingers increases and the tissue releases.

Question 3. The area surrounding the superior angle of the scapula is often dense, painful, and adhered. Muscles with a wide variety of fiber directions emanate from that general area. How should you proceed in releasing the layers of tissue? Describe the order of tissues that you will treat, the techniques you will use, and the direction of force that you will apply to reduce restrictions and adhesions.

Question 4. Conduct a short literature review to learn about the relationship between myofascial dysfunction and one or more of the following:

- Neurotransmitter imbalance
- Chronic infections
- Thyroid dysfunction
- Diabetes
- Stress

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