Integrating Science With Technique

INFORM YOUR APPROACH TO DELIVER MORE EFFECTIVE BODYWORK

IT ALL STEMS FROM ANATOMY

Anatomy, or structure, is the fundamental key for all manual and movement therapy. From anatomy, everything else follows: physiology (function), pathophysiology (altered function), assessment, and treatment.

Let's illustrate this using the coracobrachialis muscle as our example. The anatomy of the coracobrachialis is that it attaches from the coracoid process of the scapula to the medial surface of the humerus. From this, we can deduce that it crosses the glenohumeral (GH) joint anteriorly and medially, telling us that this muscle flexes and adducts the arm at the GH joint. Therefore, we now know the muscle's actions (physiology). Knowing this tells us what its pathophysiology would be. If the coracobrachialis were tight, in addition to perhaps causing local and/or referred pain when palpated, it would likely limit the ability of the arm to move into extension and/or abduction. Assessment would also follow: we simply challenge the muscle to stretch by moving the arm into extension and abduction, and look for decreased range of motion. Further, we could use our knowledge of the attachments and actions of the muscle to palpate it and determine the integrity of its tissue. Treatment would follow by performing manual therapy and stretching to loosen and lengthen the coracobrachialis.

Even though anatomy course work can feel like a memory game while in school, the effort spent to learn anatomy pays dividends many times over. I view anatomy education as the dues that must be paid to be able to reason through the physiology, pathophysiology, assessment, and treatment necessary for effective clinical orthopedic manual therapy. From a teaching point of view, anatomy can become vibrant and enchanting if the instructor and the learning resources apply the anatomy to the actual assessment and treatment techniques that form the profession—in effect integrating the science content with the hands-on content.

By Joseph E. Muscolino, DC

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All muscles that cross the hip joint anteriorly with a vertical component to their fiber direction are hip joint flexors. *Muscolino, Joseph E.* The Muscular System Manual, *3rd ed. Elsevier, 2010.*

Do you bring science to your massage table and to your hands-on work? Or do you treat them exclusively from one another?

In some schools, science and technique are taught independently from each other, sometimes leaving practitioners without the important interfacing of disciplines that could positively inform their work.

With a true integration of science and manual therapy, new therapists are empowered to think critically, creatively applying their assessment and treatment techniques to address a client's needs.

CLINICAL ORTHOPEDIC MANUAL THERAPY

A disconnect between the sciences and hands-on work may not be of the utmost importance when manual therapy is done for the purpose of relaxation, but it matters greatly if clinical orthopedic manual therapy (COMT)—sometimes referred to as *medical massage*—is being performed. COMT's goal is to remedy a specific musculoskeletal condition with which the client presents. This requires an understanding of the mechanism of the client's condition, as well as an understanding of the mechanisms of the appropriate assessment and treatment techniques. It also requires a clear understanding of the science—in other words, the structure and function of myofascial tissue. In these circumstances, a disconnect between science knowledge and hands-on knowledge can result in therapists being less able to render effective and successful manual therapy for their clients.

INTEGRATING SCIENCE AND HANDS-ON WORK

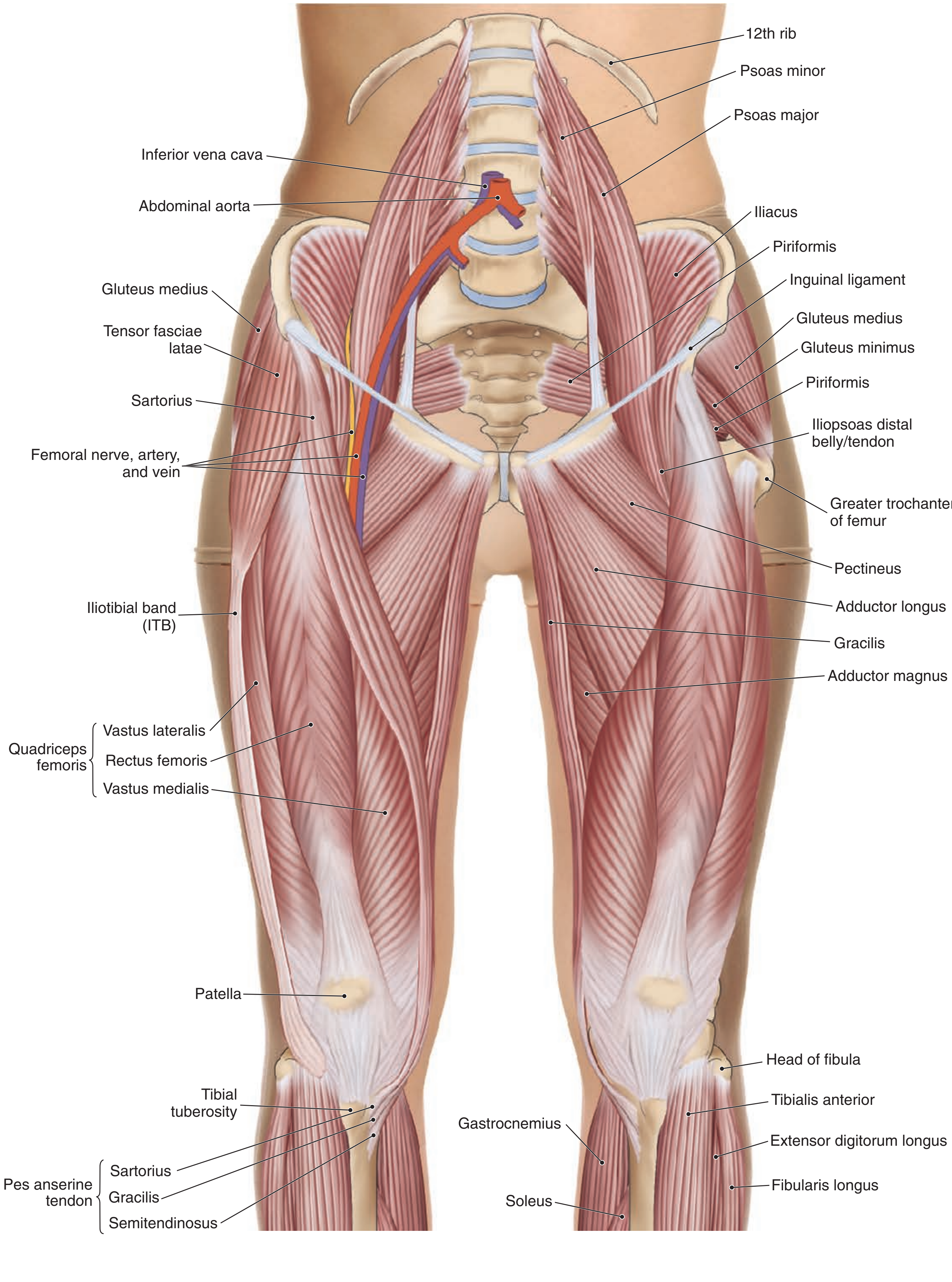
Following are examples of how the knowledge and understanding of the science of myofascial tissue can lead to an enrichment and empowerment of our skills as manual therapists.

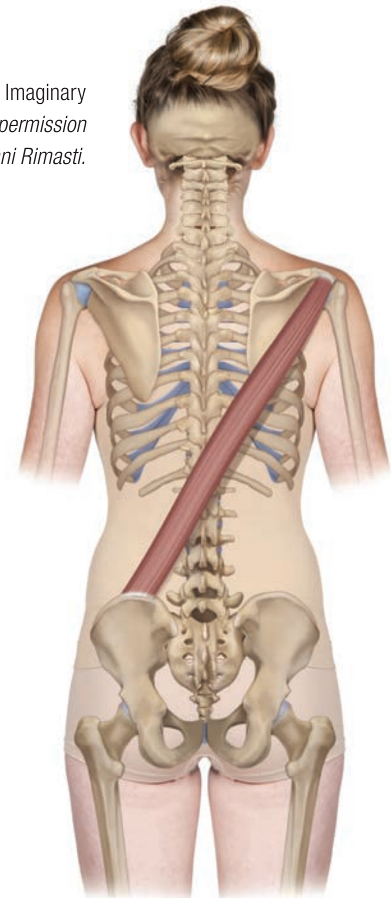
Understanding Versus Memorizing

Having a command of the actions of muscles is critically important to both assessment and treatment techniques. When learning anatomy as students, we are first confronted with two tasks: learning the attachments of the muscle and learning its actions. I believe this work can be cut in half if an understanding of muscle function is applied at the same time, which is why most schools teach kinesiology in addition to anatomy.

At its essence, a muscle is a pulling machine. When it contracts, it creates a pulling force toward its center. It is as simple as that. Therefore, if we look at the line of the pull of the muscle compared to the joint it crosses, we can figure out the action(s) of the muscle.

For example, every muscle that crosses the hip joint anteriorly with a vertical component to its fiber direction can flex the thigh at the hip joint. Instead of memorizing this joint action individually for each and every muscle that crosses the hip anteriorly (i.e., the tensor fasciae latae, rectus femoris, sartorius, iliacus, psoas major, etc.), this one concept can be applied to all the muscles in the front of the hip. So, if we know that a muscle crosses the hip joint anteriorly with a vertical component to its fiber direction, we know it is a hip flexor (Image 1). Similarly, all muscles that cross the hip joint posteriorly, with a vertical component to their fiber direction, can extend the thigh at the hip joint.


12th rib
Psoas minor
Psoas major
Inferior vena cava
Abdominal aorta
Iliacus
Piriformis
Inguinal ligament
Gluteus medius
Tensor fasciae latae
Gluteus medius
Gluteus minimus
Sartorius
Piriformis
Iliopsoas distal belly/tendon
Femoral nerve, artery, and vein
Greater trochanter of femur
Pectineus
Adductor longus
Iliotibial band (ITB)
Gracilis
Adductor magnus
Quadriceps femoris
Vastus lateralis
Rectus femoris
Vastus medialis
Patella
Head of fibula
Tibial tuberosity
Tibialis anterior
Gastrocnemius
Extensor digitorum longus
Pes anserine tendon
Sartorius
Gracilis
Semitendinosus
Fibularis longus
Soleus



Can you figure out its actions? See the Imaginary Muscle Exercise at right. *Reproduced with permission from Joseph E. Muscolino. Artwork by Giovanni Rimasti.*

The idea is that instead of trying to learn and memorize the actions for each of the many, many muscles of the body, we can learn muscle actions by placing muscles into their functional groups based on their location. For example, hip flexors are in front, extensors are in back, abductors are on the outside, and adductors are on the inside (rotators do not fall as neatly into functional groups based on location, but can still be understood by looking at the direction in which they wrap around the hip joint). And these functional groups can be combined. For example, if a muscle is in front and toward the outside, it both flexes and abducts the hip joint. Seeing lines of pull to place muscles into functional groups is not difficult; it just takes a little practice. And when applied, it saves literally half the work of learning the muscles of the body.

Reverse Actions

Applying the simple fundamental idea that a muscle's contraction results in a pulling force upon its attachments, and that this force is directed toward the center of the muscle, can be applied to better understand what are referred to as (closed-chain) *reverse actions*. A reverse action occurs when a muscle contracts and its proximal attachment moves toward its distal attachment (instead of its distal attachment moving toward the proximal one); or, on the axial body, its inferior attachment moves toward its superior attachment (instead of the superior attachment moving toward the inferior one). These reverse actions tend to occur when the end of the extremity (foot or hand) is against a stable surface (hence the term *closed-chain*), increasing its resistance to movement so the proximal attachment has less resistance to moving than the distal one.

When a muscle contracts, its pulling force is exactly the same on both of its attachments, so reverse actions are actually quite common in the body. This is especially true in the lower extremity because the foot is so often on the ground. For example, all flexors of the thigh at the hip joint are anterior tilters of the pelvis at the hip joint (Image 2A–B). And, ironically, this reverse pelvic action is likely more important to the client's health than the standard thigh action. Tight hip flexors do not cause the thigh to be posturally locked into flexion up in the air; rather they cause the pelvis to increase its anterior tilt, which then impacts the posture of the spine (Image 3A–C). Applying the simple concept of how a muscle contracts allows us to better understand reverse actions and their impact on our clients' postural patterns.

Imaginary Muscle Exercise

A creative and instructive exercise to demonstrate how to use the attachments of a muscle to figure out its actions is to ask someone to create an imaginary muscle. The person needs to only state what the muscle's attachments are and trace its path from one attachment to the other. From this, it should be possible to figure out what the actions of this imaginary muscle are. This exercise can even be more creative by allowing the muscle to cross from one side of the body to the other. The more creative, the more fun it is.

The accompanying figure shows an imaginary muscle that attaches from the person's right acromion process of the scapula to the person's left posterior iliac crest. Can you figure out its actions? Postulate your theory before moving on.

The Answer

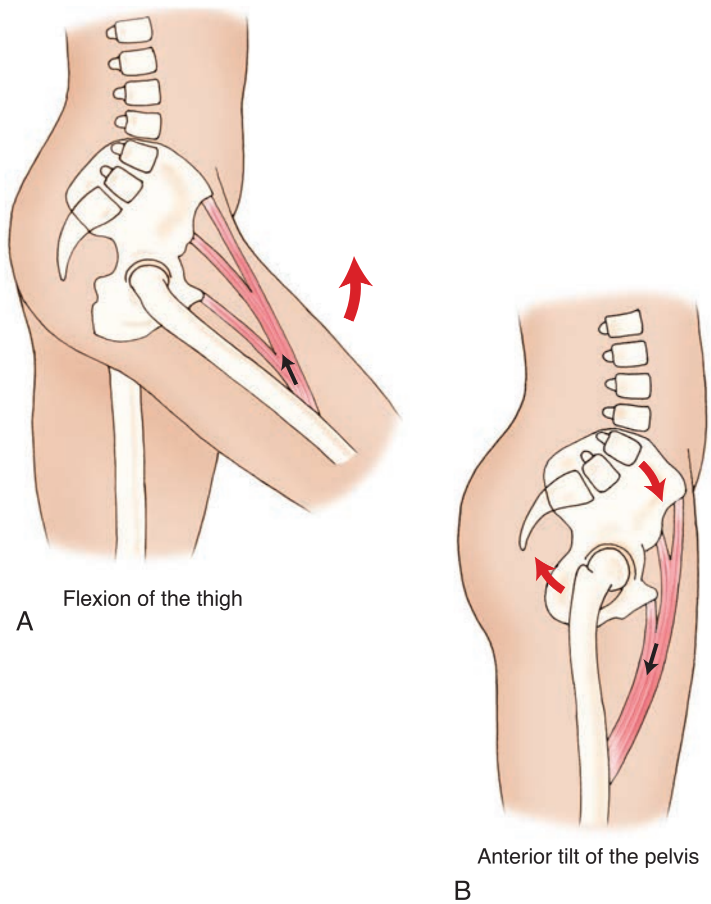
Pulling across the spinal joints, this imaginary muscle crosses the spinal joints posteriorly with a vertical component to the direction of fibers; therefore, it extends the trunk at the spinal joints in the sagittal plane.

Because this muscle crosses the upper trunk laterally on the right side, it right laterally flexes the upper trunk at the spinal joints in the frontal plane. But because it crosses the lower trunk laterally on the left side, it left laterally flexes the lower trunk at the spinal joints in the frontal plane.

Because it wraps from the upper right trunk to the lower left pelvis, it right rotates the trunk at the spinal joints in the transverse plane.

By pulling on the pelvis, it would anteriorly tilt the pelvis in the sagittal plane, elevate the left side of the pelvis in the frontal plane, and left rotate the pelvis in the transverse plane (as well as extend the lower trunk, left laterally flex the lower trunk, and right laterally flex the upper trunk, by moving the "lower" spinal joints relative to the "upper" spinal joints, and left rotate the lower trunk relative to the upper trunk at the spinal joints).

Pulling on the scapula, it could depress, retract, and downwardly rotate the right scapula at the scapulocostal joint.



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All flexors of the thigh at the hip joint are anterior tilters of the pelvis at the hip joint. A: Flexion of the thigh at the hip joint. B: Anterior tilt of the pelvis at the hip joint. *Muscolino, Joseph E.* Kinesiology: The Skeletal System and Muscle Function, *2nd ed. Elsevier, 2006.*

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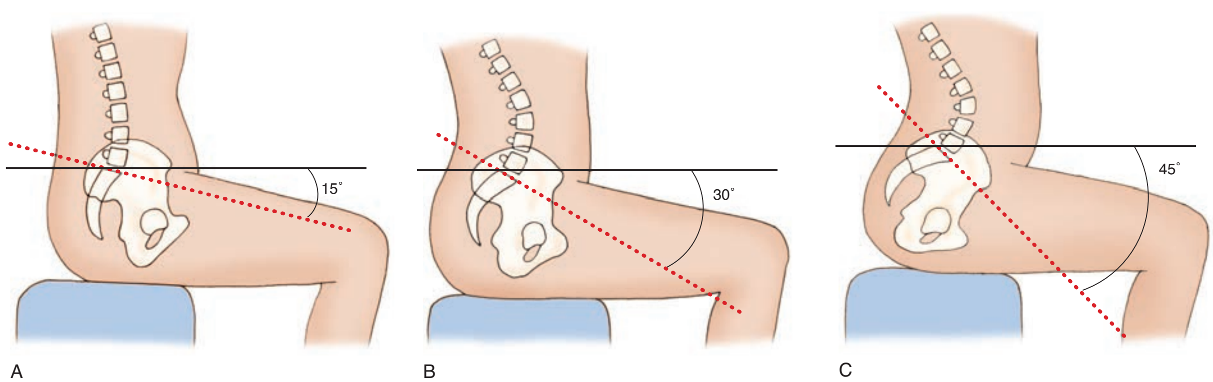
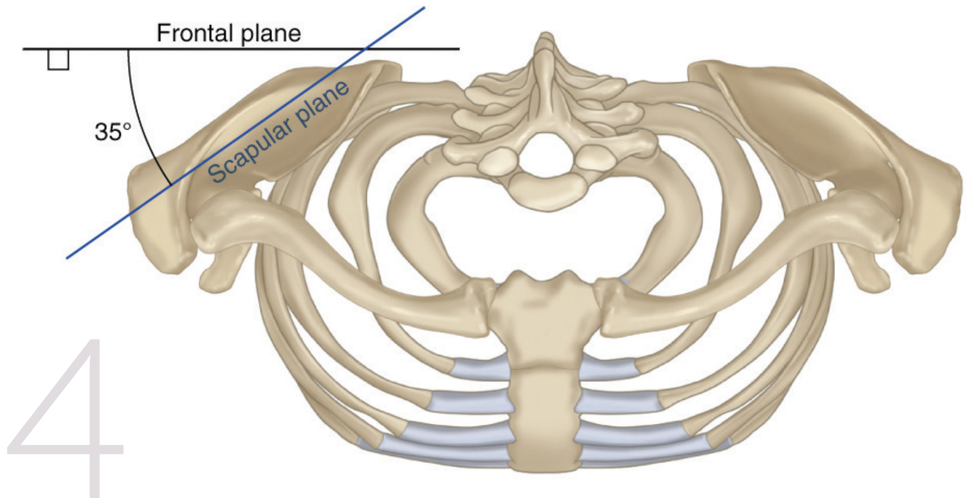


The degree of pelvic anterior tilt determines the sagittal plane curvature of the lumbar spine. A: Decreased pelvic anterior tilt results in decreased lumbar lordosis. B: Normal "neutral pelvis" posture results in normal lumbar lordosis. C: Increased pelvic anterior tilt results in increased lumbar lordosis. *Muscolino, Joseph E.* Kinesiology: The Skeletal System and Muscle Function, *2nd ed. Elsevier, 2006.*



The plane of the scapula is approximately 35 degrees off the frontal plane toward the sagittal plane (superior to inferior view). *Muscolino, Joseph E. Artwork by Giovanni Rimasti. Modeled from Donald Neumann's* Kinesiology of the Musculoskeletal System: Foundations for Rehabilitation, *2nd ed. Elsevier, 2010.*

Asking the client to move the arm in the plane of the scapula better engages the supraspinatus for palpation than asking for pure abduction. *Muscolino, Joseph E.* The Muscle and Bone Palpation Manual, *2nd ed. Elsevier, 2016.*

Motion Patterns

There is a distinction between the *motion* a muscle creates and the *joint actions* it creates. In kinesiology, a muscle's (joint) action is a cardinal plane (i.e., sagittal, frontal, transverse) component of the motion that it creates. Sometimes the motion of a muscle is the same as its action; this occurs when the muscle's line of pull is oriented perfectly in a cardinal plane. For example, the motion of the brachialis is its cardinal plane action of flexion at the elbow joint.

However, most of the time, a muscle's line of pull is oriented within an oblique plane. In these cases, the muscle's contraction causes an oblique plane motion. But in kinesiology, we do not directly name a muscle's oblique plane motion; rather, we describe the motion by breaking it up into its cardinal plane components, and we then list these cardinal plane actions separately.

A good example is the supraspinatus. The supraspinatus is oriented along the line of the scapula, which, in healthy posture, is approximately 35 degrees away from the frontal plane toward the sagittal plane (Image 4). This means that when the supraspinatus contracts, it must pull the arm in an oblique plane line that is 35 degrees off the frontal plane toward the sagittal plane. So, we state that the supraspinatus abducts and flexes the arm at the glenohumeral (GH) joint. Unfortunately, this leads many students and therapists to believe that the supraspinatus can abduct the arm. It cannot. At least, it cannot create pure abduction. When it pulls toward abduction in the frontal plane, it must also pull the arm toward flexion in the sagittal plane. Even more confusing, some textbooks leave out the flexion component of its motion entirely, so the student is even more likely to believe the supraspinatus can do (pure) abduction.

Why does this matter? One application is palpation. When we want to locate a muscle to palpate it, we usually ask the client to engage the muscle to contract so it is the only *hard* soft tissue among the sea of *soft* soft tissues. In the case of the supraspinatus, asking the client to move the arm in the oblique plane that is between abduction and flexion will generate a better contraction to facilitate palpation than by asking for pure abduction alone (Image 5). (Note: ask for only 10–15 degrees of motion so the upper trapezius is less likely to contract to stabilize the scapula and/or move the scapula into upward rotation.)

Another application would be stretching. Knowing that the supraspinatus has a component of flexion tells us that adduction with extension would more effectively stretch it than adduction with flexion. Even client self-care advice would be affected. Given that the supraspinatus is involved with flexion, flexion movements of the arm at the GH joint would use, and possibly stress, the muscle and its tendons. Therefore, if a client has a supraspinatus injury, advising him to avoid GH joint flexion would be important.

Palpation

Palpation is likely the most important orthopedic assessment tool a manual therapist possesses—and massage therapists may be the best palpators of soft tissue in the health field. But there are so many ways that a strong understanding of science can improve one's palpation skills, including understanding the true *motion* pattern of a muscle (as discussed previously under Motion Patterns), scapulohumeral rhythm, and reciprocal inhibition.

Scapulohumeral Rhythm: Scapulohumeral rhythm describes the characteristic synergistic movement of the scapula when the humerus moves. For example, extension and/or adduction of the arm at the GH joint is accompanied by downward rotation of the scapula. We can use this knowledge to engage scapular downward rotator muscles, such as the pectoralis minor and rhomboids, when palpating them. By asking the client to extend and adduct the arm, the rhomboids and pectoralis minor will be engaged to accompany the arm movement with scapular downward rotation. This is probably the most effective way to engage and palpate these muscles (Image 6).

Reciprocal Inhibition: Another application of science for palpation is to make use of the neurologic reflex known as reciprocal inhibition. When a joint motion occurs, the antagonist musculature on the other side of the joint must lengthen to allow the motion, so the nervous system neurologically inhibits (i.e., relaxes) it. One example of a palpation protocol utilizing reciprocal inhibition is the levator scapulae muscle. At its scapular attachment, the levator scapulae is deep to the upper trapezius. This creates a problem, because if we ask the levator scapulae to contract to elevate the scapula, the more superficial upper trapezius will also contract, blocking our ability to palpate and discern the deeper levator scapulae. Therefore, we make use of reciprocal inhibition to keep the upper trapezius relaxed. We do this by placing the client's arm into extension and adduction, which calls on downward rotation of the scapula. This causes reciprocal inhibition of all upward rotators, including the upper trapezius (Image 7). (Note: this also makes use of the principle of scapulohumeral rhythm discussed earlier.)

Orthopedic Assessment

The ability to assess our clients using special orthopedic assessment tests is also improved when we understand the anatomic/physiologic mechanism that underlies each test. An assessment test is simply a physical stress that is aimed at a specific (target) structure. By examining the position and/or movement of the test, we can determine how it affects the client's target structure and, therefore, better understand how to interpret the test results.

A simple example is the Thomas Test, in which the supine client is asked to extend the thigh at the hip joint (Image 8). When the thigh does not drop down below the height of the table, the Thomas Test is positive, and it is then often asserted that the psoas major is tight. Yet, how do we

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Via scapulohumeral rhythm, extension and adduction of the arm engages the pectoralis minor as a downward rotator of the scapula. *Muscolino, Joseph E.* The Muscle and Bone Palpation Manual*, 2nd ed. Elsevier, 2016.*

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Extension and adduction of the arm reciprocally inhibits the upper trapezius so the deeper levator scapulae can be palpated. *Muscolino, Joseph E.* The Muscle and Bone Palpation Manual*, 2nd ed. Elsevier, 2016.*

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The Thomas Test shows restriction of hip joint extension. *Muscolino, Joseph E.* Manual Therapy for the Low Back and Pelvis: A Clinical Orthopedic Approach. *Lippincott Williams & Wilkins, 2014.*

know that it is the psoas major causing the restricted extension at the hip joint? The psoas major is not the only hip flexor that, if tight, would restrict extension. There are approximately 10 other hip flexors that, if tight, could result in a positive Thomas Test. Therefore, a postive Thomas Test tells us that a hip flexor or multiple hip flexors are tight. It doesn't necessarily tell us which hip flexor is tight.

Another example is the Nachlas Test for the sacroiliac joint (SIJ). The Nachlas Test is performed by passively bringing the prone client's foot toward the buttock (Image 9). Pain at the SIJ is positive for SIJ pathology. Why? Bringing the foot toward the buttock causes flexion of the knee joint. This stretches the quadriceps femoris musculature, including the rectus femoris, which, when pulled taut, exerts this tension on the pelvic bone on that side, pulling it toward anterior tilt. But, the other pelvic bone is stabilized on the table, so if one pelvic bone moves and the other does not, motion occurs at one or both SIJs. If an SIJ is irritated or inflamed, pain will likely result. If pain occurs at the opposite side (contralateral) SIJ, then it is also likely that the same-side (ipsilateral) SIJ is hypomobile, thereby causing the sacrum to move with the ipsilateral pelvic bone, resulting in motion at the contralateral SIJ instead. Therefore, pain contralaterally also indicates hypomobility of the ipsilateral SIJ. Further, if the ipsilateral SIJ is hypomobile and the sacrum moves, it also moves relative to the L5 vertebra, causing motion to occur at the lumbosacral joint as well. If the lumbosacral joint is irritated or inflamed, pain might occur there. All of these findings can be reasoned out if one understands the mechanism—in other words, the science—of this orthopedic test.

Stretching

Stretching, at its core, is a straightforward, mechanical process. It is simply making a soft tissue longer. When stretching a muscle, if we know what the joint action of the muscle is, then we know its shortening concentric joint action. How do we lengthen and stretch it? Simply do the opposite of its shortening joint action. And, if a muscle has more than one action, create the motion that is the opposite of all of its actions.

An excellent example is the upper trapezius. Its actions on the neck and head are extension in the sagittal plane, (ipsi) lateral flexion in the frontal plane, and contralateral rotation in the transverse plane. So, using the right upper trapezius as our example, given that it extends, right laterally flexes, and left rotates the head and neck, it would be optimally stretched by bringing the client's head and neck into flexion, left lateral flexion, and right rotation. Stretching a muscle in all of its planes of action can be referred to as *multiplane stretching*. And, given the right upper trapezius's action of elevation of the scapula, the scapula should be stabilized to prevent it from elevating (Image 10).

The Nachlas Test for the sacroiliac joint. *Muscolino, Joseph E.* Manual Therapy for the Low Back and Pelvis: A Clinical Orthopedic Approach. *Lippincott Williams & Wilkins, 2014.*

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Not understanding the concept of multiplane stretching risks creating an ineffective stretch. For example, if the therapist does not consider the transverse plane component of the upper trapezius stretch and allows the client's head/neck to rotate to the left during the stretch, then the right upper trapezius will be slackened in the transverse plane and the effectiveness of the stretch will be compromised. The stretch for the upper trapezius does not need to be memorized. Like all stretches, it can be figured out by simply doing the opposite of the muscle's joint actions; in other words, applying the science of the muscle to its hands-on treatment.

Neural Inhibition Stretching

There are essentially two neurologic reflexes that inhibit/relax musculature. They are the Golgi tendon organ (GTO) reflex and reciprocal inhibition. The GTO reflex is the foundation of what is known as contract relax (CR) stretching, also known as postisometric relaxation (PIR) stretching, or proprioceptive neuromuscular facilitation (PNF) stretching (note: at present, there is controversy regarding the GTO reflex's role in this type of stretching). Reciprocal inhibition reflex is the foundation of what is known as agonist contract (AC) stretching—the basis for Aaron Mattes's Active Isolated Stretching (AIS) technique.

Understanding the mechanism of the GTO reflex, we realize that the fundamental mechanism for CR stretching is to create a contraction in the target muscle so tension is transferred to its tendons, thereby exciting the reflex. Any stretch can be transitioned to be a CR stretch by applying this knowledge. Image 11 demonstrates the CR technique applied to stretching the right upper trapezius.

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Multiplane stretching of the right upper trapezius. It is stretched into flexion, left lateral flexion, and right rotation (note: the scapula is stabilized). *Muscolino, Joseph E.* Advanced Treatment Techniques for the Manual Therapist: Neck. *Lippincott Williams & Wilkins, 2009.*

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Contract relax stretching of the right upper trapezius. After the client is asked to isometrically contract against the resistance of the therapist, the therapist pushes the head/neck further into flexion, left lateral flexion, and right rotation. *Muscolino, Joseph E.* Advanced Treatment Techniques for the Manual Therapist: Neck. *Lippincott Williams & Wilkins, 2009.*

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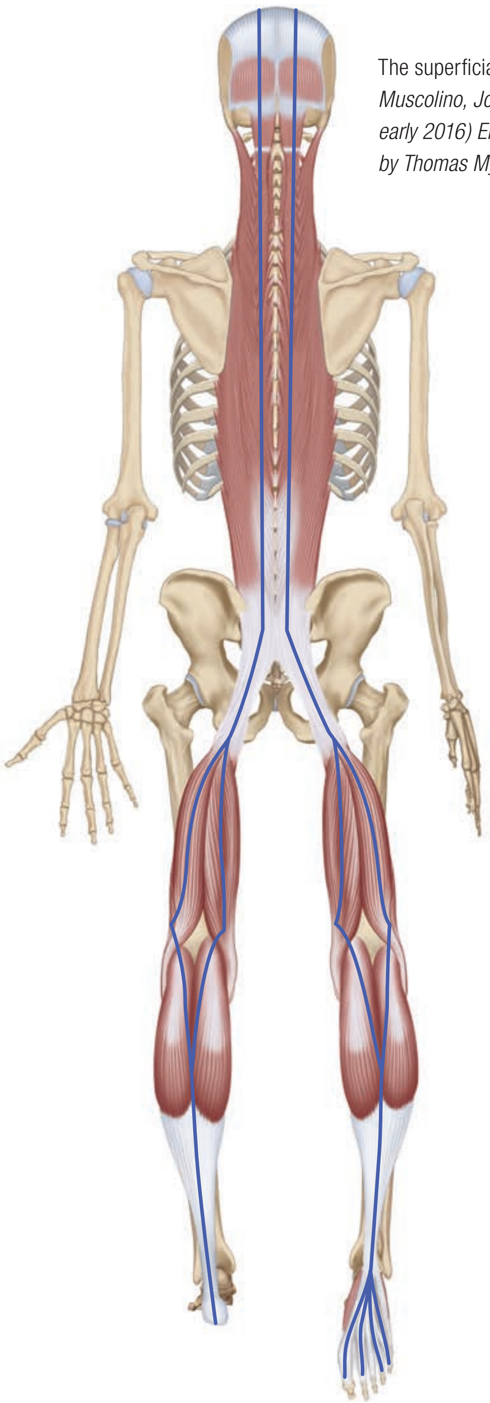
Agonist contract stretching of the right upper trapezius. A: Starting position. B: Concentric contraction of the head/neck into flexion, left lateral flexion, and right rotation. C: Further stretch of the right upper trapezius. D: Passively returning the client to the starting position. *Muscolino, Joseph E.* Advanced Treatment Techniques for the Manual Therapist: Neck. *Lippincott Williams & Wilkins, 2009.*

Similarly, any stretch can be transitioned into an AC stretch if we can set up the stretch so the target muscle is the antagonist of the concentric contraction motion that occurs, thereby exciting the reciprocal inhibition reflex to inhibit/relax it. Image 12 demonstrates the AC technique applied to stretching the right upper trapezius.

So, if we understand what the underlying mechanism of a CR or an AC stretch is, we can figure out how to create that stretching protocol for our target muscle. And, if we like, we can perform a stretch protocol on our target muscle that involves both reflexes; in other words, perform a CR stretch and an AC stretch—a CRAC stretch, if you will. The point is we can figure out how to perform all stretching protocols by understanding the underlying science of the target muscle and of the stretching technique being employed.

Trigger Point Treatment

Trigger point treatment is another excellent example of the importance of understanding the underlying science of a condition. Research shows that a trigger point is a zone of ischemia (compromised arterial supply to the tissue). Therefore, it would stand to reason that whatever treatment technique is used should have as its goal an increase of the arterial supply to the tissue of the trigger point. Static compression is the treatment technique most often employed. The reasoning often stated is that when the pressure is released, blood flushes into the tissue of the trigger point. However, if it is the release of the pressure that causes the increased arterial supply, then it stands to reason that deep stroking massage would be more effective, because 5–10 strokes, with 5–10 corresponding releases, can be performed in the time that one static compression is performed. (Note: it is also unlikely that static compression causes any neurologic reflex that helps alleviate a trigger point. Studies in which the motor neuron to the trigger point



The superficial back line myofascial meridian reaches from the foot to the head. *Muscolino, Joseph E.* The Muscular System Manual*, 4th ed. (to be released in early 2016) Elsevier, 2017. Artwork by Giovanni Rimasti. Modeled from a figure by Thomas Myers*: Anatomy Trains, *3rd ed. Churchill Livingstone, 2014.*

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has been cut found that the trigger point persists. This suggests a trigger point, once formed, is a local phenomenon and is not mediated by the central nervous system.)

Myofascial Meridians

One further example of using science to improve assessment and treatment skills is to understand the relationship of muscles in what are known as myofascial meridians (described and popularized in Thomas Myers's excellent book *Anatomy Trains: Myofascial Meridians for Manual & Movement Therapists*, 3rd ed.). A myofascial meridian is a continuity of myofascial tissues across the body.

For example, the superficial back line myofascial meridian is composed of the plantar fascia, Achilles tendon, gastrocnemius, hamstrings, sacrotuberous ligament, thoracolumbar fascia, and paraspinal musculature into the epicranial fascia of the head (Image 13). Therefore, it is possible for tension in any part of the meridian to transfer to distant reaches of the meridian. One example of this is the relationship between the hamstrings and the SIJ. Given the connection via the sacrotuberous ligament, tight hamstrings on one side of the body could pull on the sacrum on that side, thereby decreasing motion of that SIJ. Therefore, if a hypomobile SIJ is found, perhaps one of the possible causes to investigate and assess would be tight hamstrings on that side. It is an understanding of the science that allows us to know to look for these connections in the body.

CONCLUSION

There is no doubt that integrating science with hands-on skills is critically important to nearly all aspects of orthopedic assessment and treatment. Although a number of examples were given to inform this conversation, they are but a few of the many, many examples that could have been presented. A clear understanding of the science of myofascial tissue could and should inform most every aspect of manual therapy. Integrating science with hands-on assessment and treatment techniques empowers the therapist to think critically and, therefore, creatively apply the techniques that will best benefit the client on the table. It could be said that good hands, along with a good mind, create a great manual therapist. **m&b**

Joseph E. Muscolino, DC, has been a massage therapy educator for more than 25 years and is the author of numerous textbooks on manual therapy including *The Muscle and Bone Palpation Manual* (Elsevier, 2016), *Kinesiology* (Elsevier, 2006), *The Muscular System Manual* (Elsevier, 2010), *Low Back Therapy for the Manual Therapist* (Lippincott Williams & Wilkins, 2015), and *Advanced Treatment Techniques for the Manual Therapist: Neck* (Lippincott Williams & Wilkins, 2013). He is also the author of numerous DVDs on manual therapy treatment and teaches continuing education workshops across the United States and overseas, including a certification in Clinical Orthopedic Manual Therapy (COMT). Visit www.learnmuscles.com for more information.