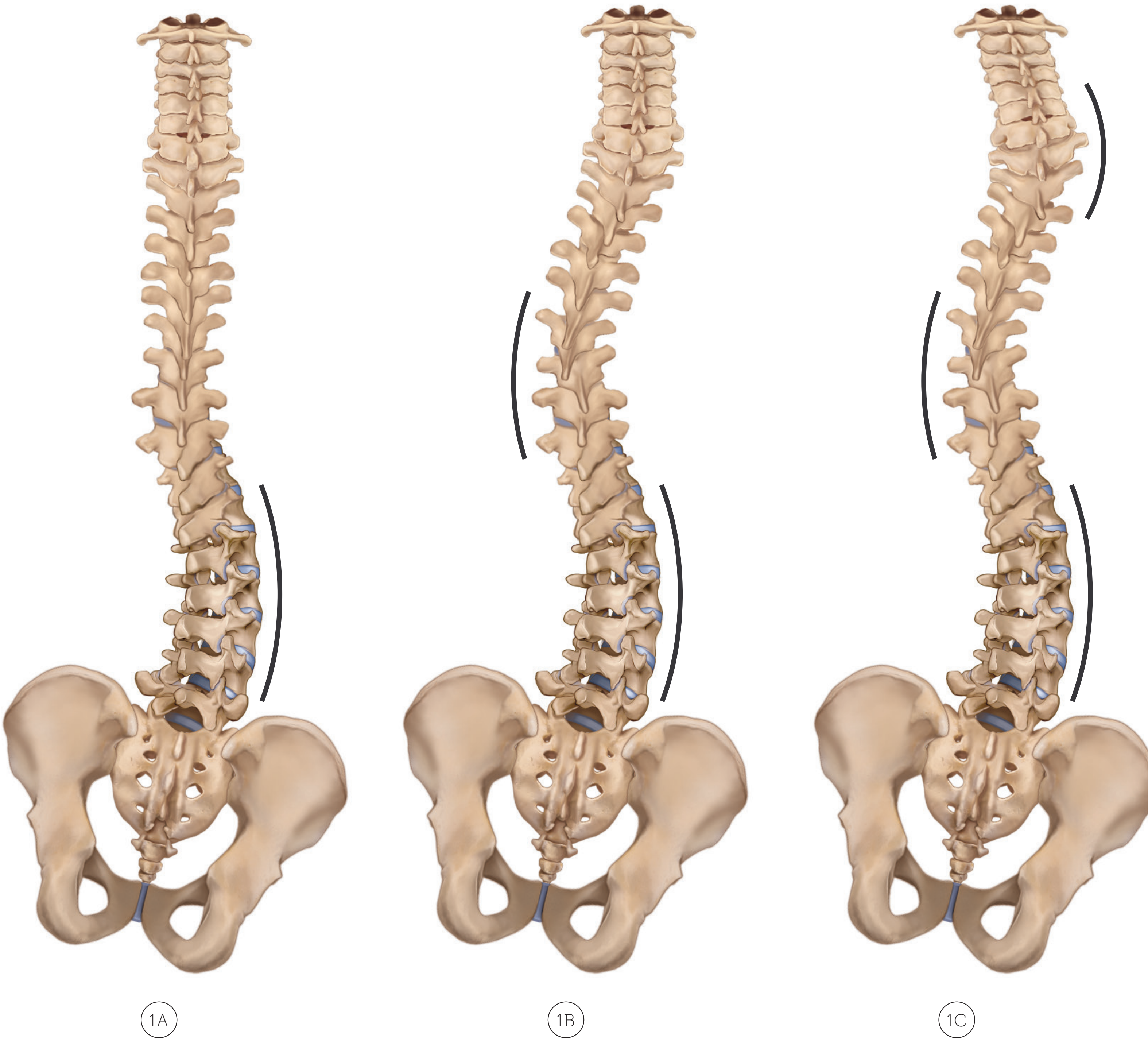
SCOLIOSIS

CLINICAL ORTHOPEDIC MANUAL THERAPY TREATMENT

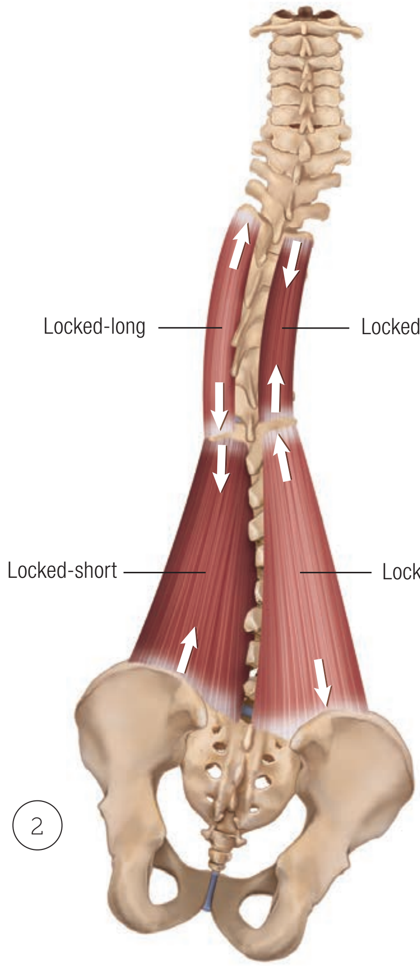
By Joseph E. Muscolino, DC

Viewed from posterior to anterior, the human spine should be straight. Any frontal plane curve seen from this view is described as a scoliosis. Therefore, by definition, scoliosis is a lateral flexion deformity of the spine. If one scoliotic curve is present, it is known as a *C-curve*. If two curves are present, it is known as an *S-curve*. And if three curves are present, it is known as a *double S-curve* (Images 1A–1C). When naming a scoliotic curve, it is named for the side of convexity. For example, the curve seen in Image 1A is a right lumbar C-scoliosis; Image 1B demonstrates a right lumbar, left thoracic S-scoliosis; and Image 1C shows a right lumbar, left thoracic, and right cervicothoracic double S-scoliosis. Further, when a scoliotic curve occurs in the frontal plane, there is also a concomitant transverse plane rotation to the curve.

In the lumbar spine, lateral flexion to one side is accompanied by rotation to the opposite side (likely due to the locked-short transversospinalis musculature on the side of concavity). The right C-curve seen in Image 1A comprises lateral flexion to the left, but rotation to the right (rotation is always named for where the anterior aspect of the vertebral body orients). One complication of this is that the spinous processes rotate into the concavity so that the degree of the scoliotic curve is usually greater than what is appreciated by visualizing or palpating the spinous processes. To fully see the degree of a lumbar scoliotic curve, an X-ray is needed.



Scoliotic curves. 1A. Right lumbar C-scoliosis. 1B. Right lumbar, left thoracic S-scoliosis. 1C. Right lumbar, left thoracic, right cervicothoracic double S-scoliosis. *All images courtesy Joseph E. Muscolino.*



Musculature on the concave side of a scoliotic curve is locked-short; musculature on the convex side is locked-long.

EFFECT OF SCOLIOSIS

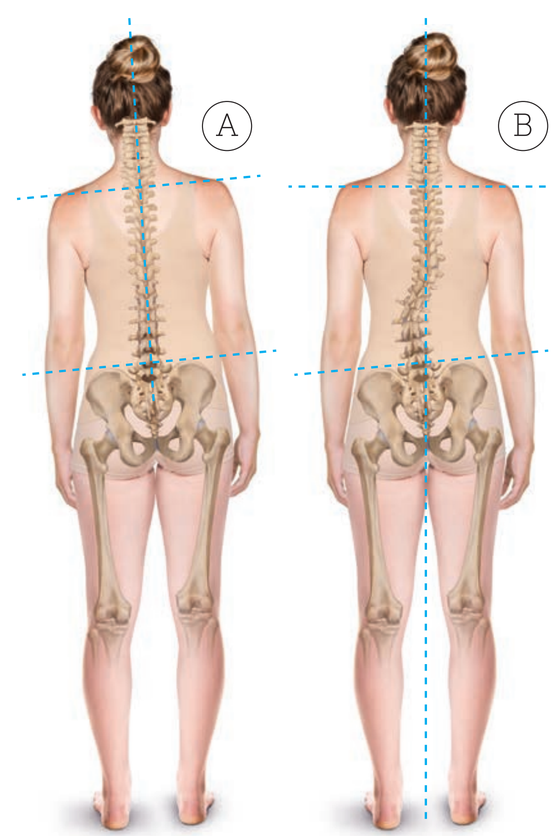
As with any postural distortion pattern, a scoliotic curve can present as mild, moderate, or severe. The degree that this impacts the client can vary tremendously. In and of itself, a scoliotic curve does not necessarily cause pain or dysfunction. There is often a tremendous lag between objective structural distortion and subjective pain and dysfunction. However, a scoliotic curve does lead to a number of compression and tension forces that will likely lead to dysfunction, if not pain, in the long run. For example, the musculature in the concavity will adaptively shorten and become locked-short. The musculature on the convex side will be lengthened and become locked-long (Image 2). Tightness of musculature often leads to pain due to the tension forces within the musculature itself, as well as on its attachments. Tight musculature will also usually resist lengthening and therefore limit motion of the joints that are crossed. Further, the facet joints and the vertebral bodies on the concave side will become compressed. The same structures on the convex side will be under tension stress. This leads to increased physical stresses on the joints that can cause pain and dysfunction, and perhaps lead to greater osteoarthritic degeneration in time.

TREATING THE UNDERLYING CAUSE OF SCOLIOSIS

Direct treatment of the scoliosis itself is extremely valuable. However, there may be an underlying cause of scoliosis that, if not addressed, will lead to a perpetuation of the scoliotic curve regardless of the manual therapy treatment performed for the tissues at the scoliotic curve. For example, if the client has a dropped arch due to overpronation of the subtalar joint, the length of the lower extremity on that side will decrease, leading to a dropped pelvis on that side. If the spine were to remain straight, it would resemble the Leaning Tower of Pisa (Image A), which would result in the eyes and inner ears being unlevel, making proprioception difficult. To prevent this, the spine would develop a compensatory scoliotic curve to bring the head to a level posture (Image B).

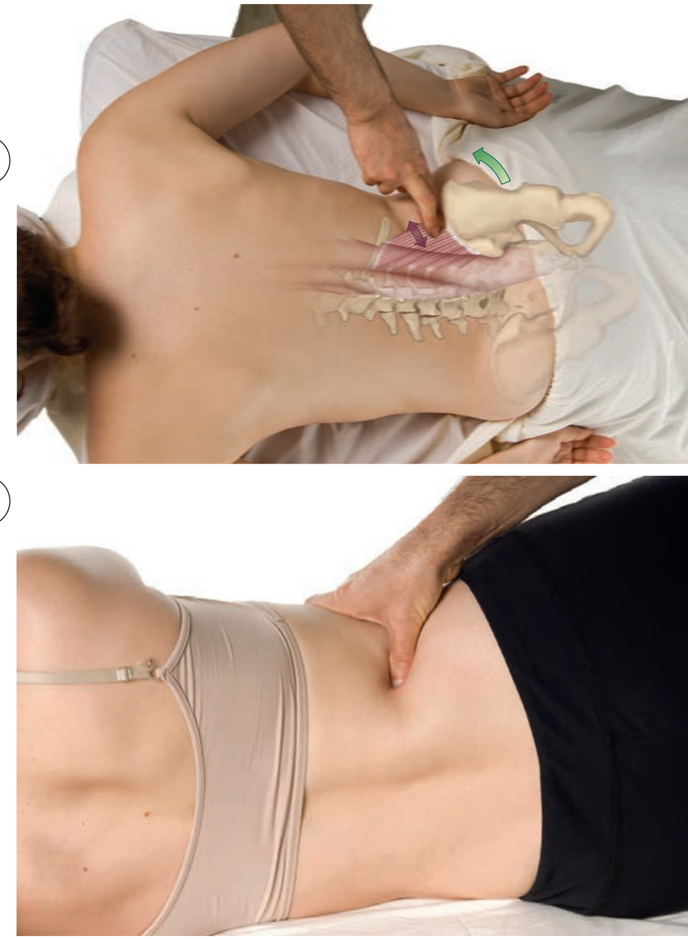
In a case like this, direct treatment of the scoliosis itself is treating the symptom, not the cause. This is not to say that treatment of the locked myofascial tissues and joint dysfunction of the scoliosis is not needed—it very much is. But it will never truly resolve the issue if the underlying cause, in this case the dropped arch, is not also resolved. Similarly, any condition that causes the pelvis to drop on one side, such as genu valgum of the knee or asymmetrical tightness of frontal plane abduction/adduction musculature of the hip joint, would likely result in a compensatory scoliosis.

Of course, not every scoliosis is caused by dysfunction in the kinematic chain of the lower extremity. Some scolioses are described as “idiopathic” because the cause of the condition is unknown (“idio” meaning unknown, and “path” referring to the condition). But because there often is an underlying structural cause of the scoliosis, it is important to assess for its possible presence, and if found, treat it.



3A

3B



Working the quadratus lumborum can be done with the client prone or side-lying. 3A. Prone. 3B. Side-lying. *Permission Joseph E. Muscolino,* The Muscle and Bone Palpation Manual with Trigger Points, Referral Patterns, and Stretching, *2nd Edition (Elsevier, 2016).*

CLINICAL ORTHOPEDIC MANUAL THERAPY TREATMENT

For all these reasons, clinical orthopedic manual therapy treatment can play an important role in the treatment plan for clients who have scoliosis. Treatment should be aimed at both loosening the tight musculature involved and mobilizing the joint dysfunction hypomobilities that occur. Tight musculature can be treated with heat, soft-tissue manipulation (massage), and stretching. Joint hypomobility dysfunction can be treated with heat and joint mobilization.

SOFT-TISSUE MANIPULATION

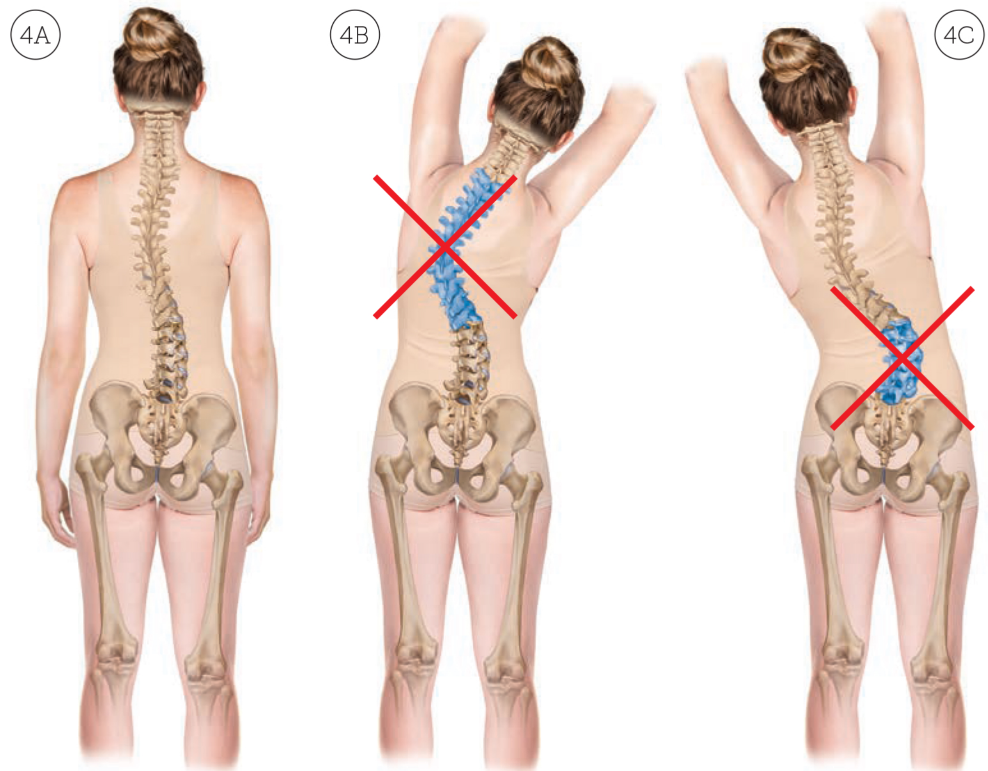
Soft-tissue massage should be oriented at any and all tight myofascial tissue. But usually, greater focus should be placed on the locked-short musculature on the side of the concavity. The primary focus should be the paraspinal musculature—the erector spinae and transversospinalis groups—but the transversospinalis musculature (rotatores, multifidus, semispinalis) in the laminar groove of the spine should be especially focused on. The quadratus lumborum should also be a primary target of massage (Image 3). As with all manual therapy, if the massage is done after heat is applied to soften and warm up the tissue, the work will usually be more effective.

I don't believe there is any one magical stroke for working on tight musculature. Because locked-short and locked-long muscles tend to be globally tight, deep stripping strokes performed along the length of the musculature can be very effective. Cross-fiber work tends to be better at breaking up patterns of adhesions that would likely develop as the condition becomes more chronic. I like to think of the manual therapist's job as being a detective, searching for the tight/taut tissues. For this reason, I am a fan of circular strokes because they allow us to approach the tissue from all angles, increasing the likelihood that we will find the tightest areas.

When performing massage, I often think of something that Sandy Fritz, massage therapy educator and author, once said to me: "No massage stroke should ever end the way it was intended when it was begun." I don't know if this statement was original to Sandy, but it has stayed with me for many years. This means that instead of performing cookbook strokes, we should amend and adjust them based on the client's tissues. When receiving massage from a new therapist, this is the first thing I notice. Is the therapist feeling my tissues? Is the therapist adjusting their work to the state of my tissues? Is the therapist adjusting their work to the response of my tissues to the stroke they are performing? The ability to adjust the work to the tissues of the client is the essence of competent clinical orthopedic manual therapy.

STRETCHING

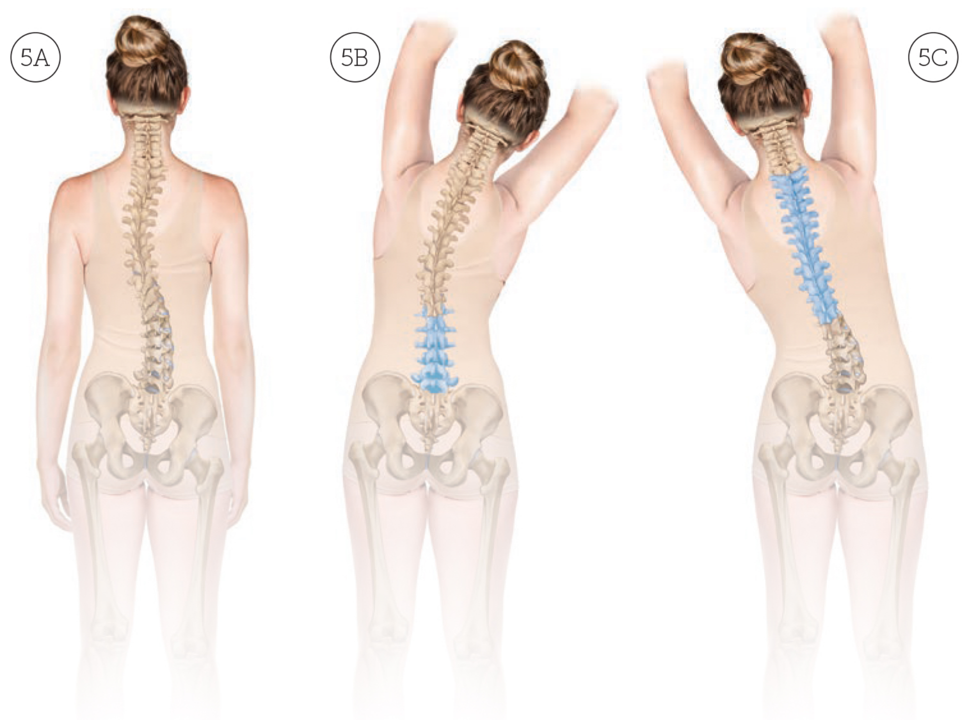
After heat and/or massage have been performed, we should stretch the client's tissues. When it comes to stretching a scoliotic spine, it is extremely important that the stretch force is applied to the scoliotic curve itself. The problem is that the scoliotic curve will resist lengthening, and the rest of the spine will tend to compensate and move instead. This is especially true if the client has an S-scoliotic curve (Image 4A). For example, if the client has a lumbar scoliotic curve of left lateral flexion (termed a right lumbar scoliotic curve based on the convexity being on the right side) and we stretch the client into right lateral flexion, if the force is not specifically applied to the lumbar region, the thoracic region will likely move instead. And if the client has a thoracic scoliotic curve in the opposite direction—in other words, a curve of right lateral flexion (termed left scoliotic curve for the convexity on the left)—it is even more likely that the thoracic spine will



4A. Right lumbar, left thoracic S-scoliosis. 4B. Stretching the spine into right lateral flexion will likely increase the thoracic scoliotic curve. 4C. Stretching the spine into left lateral flexion will likely increase the lumbar scoliotic curve.

absorb the stretch and move into right lateral flexion, preventing the stretch from occurring in the lumbar region (Image 4B). In fact, not only will the stretch not be effective for helping the lumbar scoliotic curve, it will actually worsen the thoracic scoliotic curve. The reverse of this is also true. If we stretch the client's spine into left lateral flexion with the intent of lengthening out the thoracic scoliotic curve, if not specifically applied to the thoracic region, the lumbar region will move instead, both allowing the thoracic curve to avoid being stretched, and worsening the lumbar scoliotic curve (Image 4C).

For this reason, stretching applied to the client's spine for scoliosis must be done with attention, specificity, and care. If we are giving the client self-care stretches to do at home, we need to instruct them and work with them to stretch the needed region of the spine. Looking at the same examples as in Images 4A–4C, Images 5A–5C demonstrate effective application of lateral flexion stretching in each direction.



STRETCHING

Stretching is a simple concept: it is done to make soft tissues longer. Stretching is essentially a mechanical process, although neural inhibition stretching techniques that make use of the reciprocal inhibition neurological reflex and/or Golgi tendon organ reflex can also be done. These neural techniques have many names and many abbreviations: agonist contract (AC), contract relax (CR), proprioceptive neuromuscular facilitation (PNF), PIR, AIS, MET, etc. Although there is a great deal of controversy lately about the effectiveness of stretching, there is a fundamental characteristic of soft tissue known as *creep*. That is, a sustained force placed on a soft tissue will cause the soft tissue to deform to that force. In this case, the