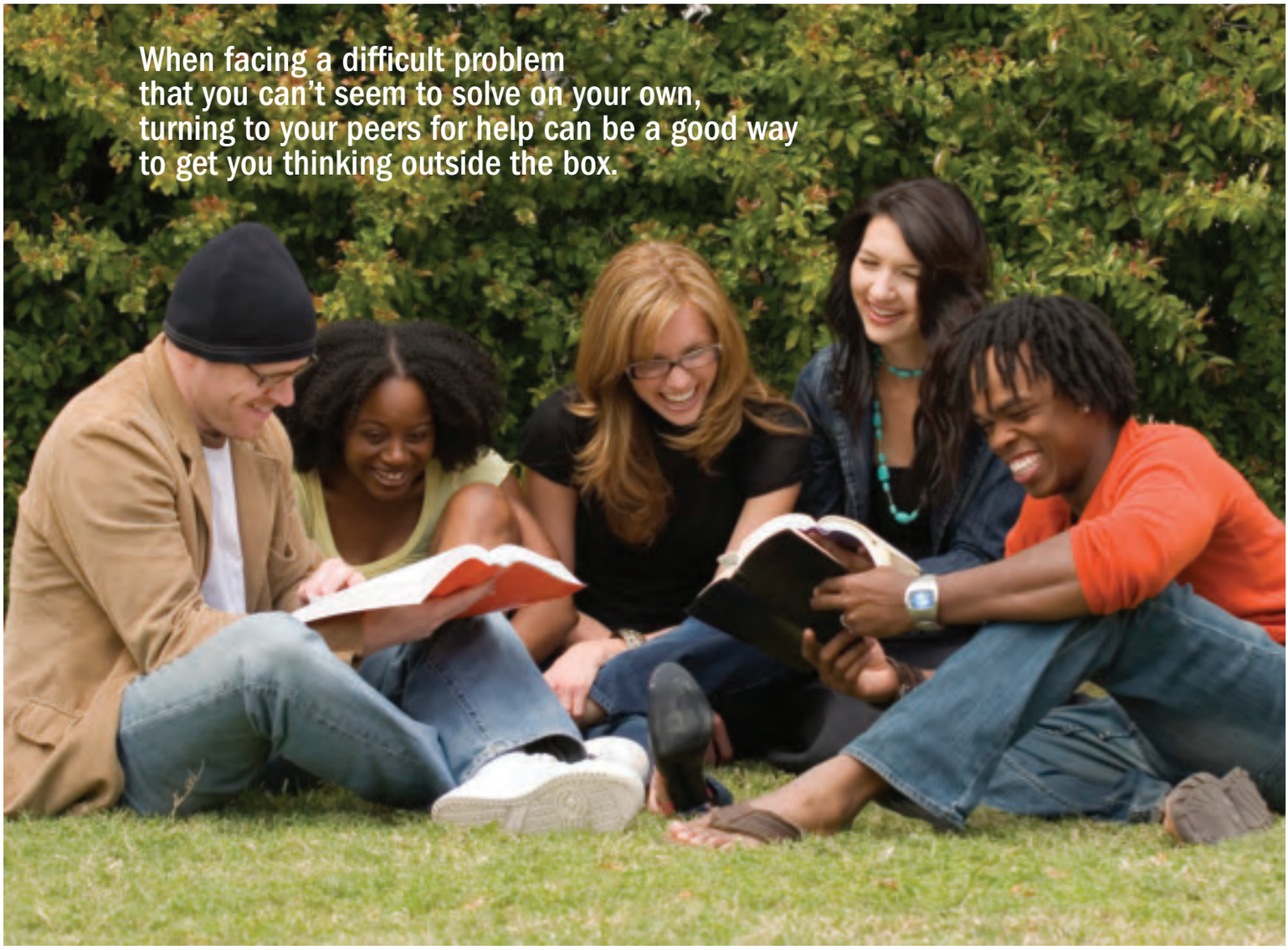

think antagonists

I often pose the following miniature case study to the students of my kinesiology class: A client comes into your office experiencing a decreased left rotation range of motion of the neck. I then ask each student, one at a time, to name a muscle that he or she would work to help this person, and it's fine for a student to name the same muscle that another student has already mentioned.

My reason for asking this question is to see how the students are connecting the information they learn about muscles in the science classroom with practical hands-on clinical application. Whether these students are early

It often gets stuck in the mind that the primary or only importance of a muscle is its mover actions. In reality, in the world of massage, what is most important is the muscle's antagonist function.

in their education or near the end, I receive mostly the same answers. The muscles they most often name are the right-sided sternocleidomastoid, trapezius, anterior scalene and cervical transversospinalis musculature (multifidus or rotatores), and the left-sided splenius capitis or cervicis, levator scapulae, or cervical erector spinae musculature (iliocostalis, longissimus, and spinalis). Their reasoning is that the right-sided muscles listed above are contralateral rotators, therefore left rotators. And the left-sided muscles listed above are ipsilateral rotators, therefore left rotators.

On one level, these responses make me quite happy because they show that the students have successfully learned the science of the muscles. They have learned the names of many muscles of the neck, they have learned which ones are contralateral rotators and which ones are ipsilateral rotators, and they have learned to reason that right-sided contralateral rotator muscles do left rotation and left-sided ipsilateral rotators do left rotation. However, these answers point to a flaw when it comes to the critical reasoning necessary to apply this knowledge to clinical scenarios. While each student was able to successfully name a left rotator muscle of the neck, what they did not realize is that the cause of the client's problem is not the left rotator musculature!

Why? If a client cannot perform full left rotation range of motion of the neck, it is extremely unlikely that the reason is that left rotator muscles, which are the mover muscles of left rotation, are too weak. After all, the weight of the neck and head is not much to move; and this movement is not against gravity. Unless the client is very elderly or weakened by disease, these muscles should be able to create this joint action.

And, even if the cause is weak left rotator mover muscles, the clinical goal would be to strengthen them and that is not within the scope of license of most massage therapists. Strengthening weak musculature is the role of athletic and fitness trainers, Pilates and yoga instructors, physical therapists and chiropractic physicians.

How about if the left rotator mover muscles are tight instead of weak? That cannot be the solution either because tight muscles do not decrease their own joint motion. In fact, if the left rotator musculature were tight enough, the client might be stuck in a posture of left rotation, without the ability to rotate to the right.

Hopefully the answer is becoming clear. The cause of the client's inability to fully left rotate the neck is not the left rotator muscles; it is the right rotator muscles, which are the antagonists to the joint action of left rotation.[1] When a muscle is tight, it limits motion to the opposite side of the body from where it is located because

[1] It is easy to become too focused on the musculature of the body and look past other tissues that can cause restriction of joint motion. In reality, any taut soft tissue on the opposite side of the joint from the restricted motion (including joint capsules, ligaments, fascial planes, or even skin) could cause a decreased range of motion. Further, degenerative joint disease (osteoarthritic bone spurs), if advanced, can also interfere with normal joint motion.

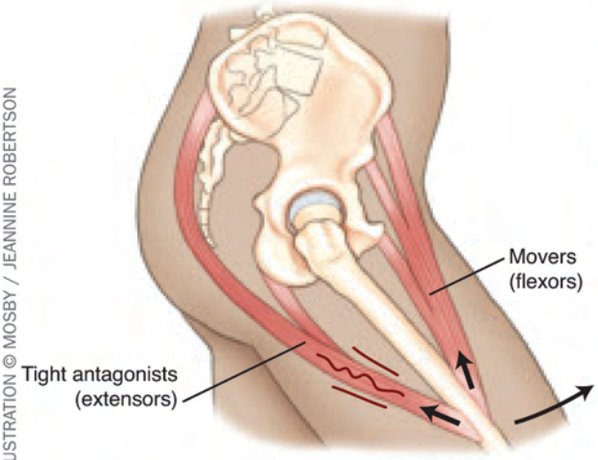

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Figure 1 Tight antagonistic hip joint extensor muscles restrict the mover muscles' ability to create full flexion range of motion of the thigh at the hip joint.

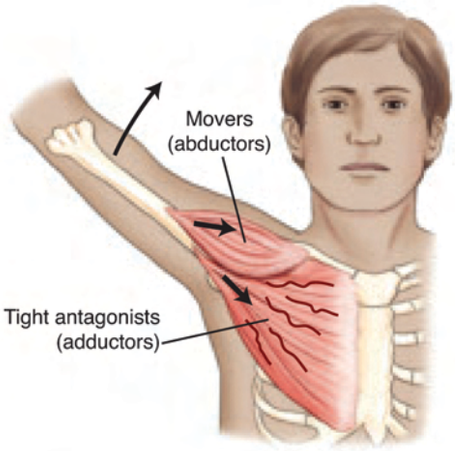

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Figure 2 Tight antagonistic shoulder joint adductor muscles restrict the mover muscles' ability to create full abduction range of motion of the arm at the shoulder joint.

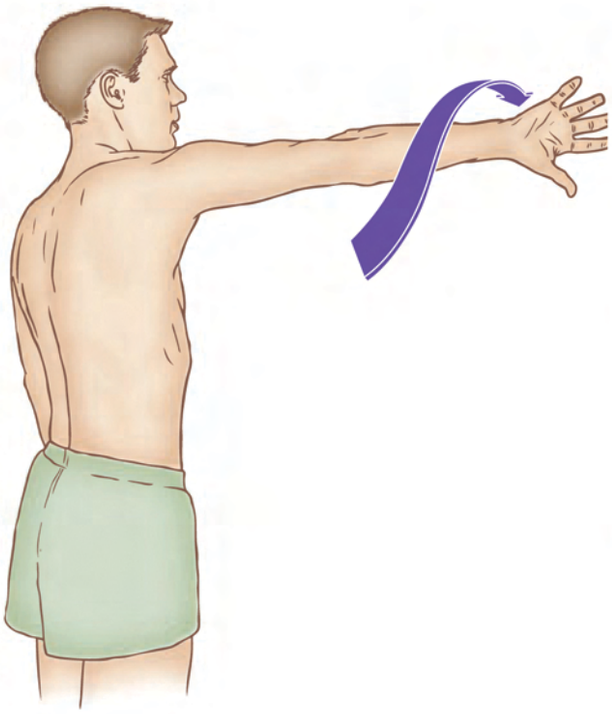

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Figure 3 The anterior deltoid's mover actions are flexion, abduction, and medial rotation of the arm at the shoulder joint. From Muscolino JE: The muscle and bone palpation manual with trigger points, referral patterns, and stretching. St. Louis, 2009, Mosby.

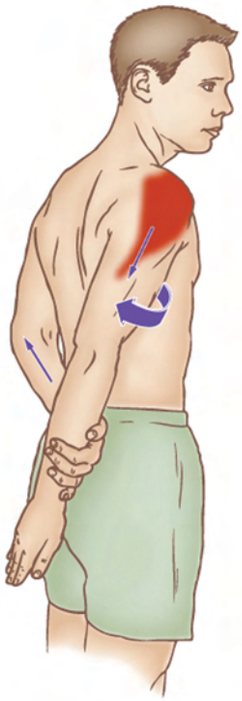

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Figure 4 Stretching the anterior deltoid is accomplished by performing the antagonist (opposite) actions of its mover actions, namely extension, adduction, and lateral rotation of the arm at the shoulder joint. From Muscolino, 2009, Mosby.

The first prerequisite of a good therapist is to have good hands. Good hands informed by a knowledgeable mind allow for the critical reasoning that can create a great clinical therapist.

it is not flexible enough to lengthen and allow that motion to occur.

I believe that the reason that most students do not immediately see this is that muscles are usually taught by presenting their mover actions. This is only reinforced by how most every textbook on muscles is written, which is to list the mover actions of each muscle of the body. The danger of teaching muscles from this point of view is that students often get it stuck in their mind that the primary or only importance of a muscle is its mover actions.

In reality, in the world of massage, what is most important is the muscle's antagonist function. For example, if a client comes in and cannot fully flex the right thigh at the hip joint, we need to immediately think of the antagonist right hip joint extensor muscles; if these antagonist muscles are tight, hip joint flexion will be limited (Figure 1). Or, if a client cannot fully abduct the right arm at the shoulder joint, we need to immediately think of the antagonist right shoulder joint adductor muscles; if these antagonist muscles are tight, shoulder joint abduction will be limited (Figure 2). In short, we need to "think antagonists."

A further benefit of thinking antagonists is that it allows us to critically reason out how to stretch a client's tight musculature. For example, if we know that a client's anterior deltoid is tight, then we can figure out how to stretch it. Given that the anterior deltoid flexes, abducts and medially rotates the arm at the shoulder joint (Figure 3), then it would be stretched by extending, adducting and laterally rotating the arm (Figure 4). A stretch for any target muscle is determined simply by performing the joint actions that are antagonistic to its mover actions.

So, whether it is assessing which muscles of a client need to be worked, or it is reasoning through how to stretch a client's tight muscles, the best advice is to think antagonists! Of course, to be able to do this, it is necessary to know the mover actions of muscles. The first prerequisite of a good therapist is to have good hands. However, good hands informed by a knowledgeable mind allow for critical reasoning skills that can create a great clinical therapist. ■

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For further reading: *Kinesiology of the Musculoskeletal System*, by Donald A. Neumann (Elsevier, 2002).