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# **NEW** **FUNCTIONAL** **TRAINING** **FOR** **SPORTS**

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# Core Training

One of the stated purposes of this book is to give you ideas you can immediately put to use. The information in this chapter can be used to improve the health and the core function of any athlete and will be of particular interest to coaches and athletes involved in striking sports such as baseball, golf, tennis, field and ice hockey, and cricket.

The core exercises presented are designed to develop a more stable platform from which to strike or throw an object. In addition, the core programs will help any athlete who suffers from low back pain. The medicine ball exercises will improve the power and coordination of all the muscle groups used in striking and throwing skills. Core training is the missing link to developing the power to hit a baseball or golf ball farther or a hockey puck or tennis ball harder and faster. In addition, core training may be a key to a long and healthy sports career.

Any training that works the abdominals, hips, and even scapulothoracic stabilizers can be viewed as core training. In fact, the best functional core exercises may be many of the unilateral knee- and hip-dominant exercises discussed in other sections of this book.

The word *core* is broad by intention to include all muscles in the body's midsection. The core muscles include the

- rectus abdominis (abdominal muscle);
- transversus abdominis (abdominal muscle);
- multifidus muscles (back muscles);
- internal and external obliques (abdominal muscles);
- quadratus lumborum (a low back muscle);
- spinal erectors (back muscles); and to some extent the
- gluteal, hamstring, and hip rotator groups (which cross the hip joint).

These muscles are the vital link between upper body strength and lower body strength. And yet, despite this critical role, core muscles are often trained in an unintelligent, scientifically unsound manner with no real regard for the actual functions of the muscles involved. Furthermore, many commonly used and prescribed core exercises may exacerbate back pain rather than prevent or relieve it.

In the past core training consisted primarily of flexion-extension exercises for the rectus abdominis muscles such as crunches or sit-ups, and the need for a stable

and powerful link from the lower body to the upper body was never addressed. Core training is done poorly primarily because it has always been done that way. This leads us back to Lee Cockrell's idea from *Creating Magic*: "What if the way we have always done it is wrong?"

## CORE FUNCTION

To truly understand core training, think back to the information on functional anatomy in chapter 1. The abdominal muscles by design are stabilizers, not movers. Even if these muscles were movers, ask yourself how many sports or sporting activities involve flexion and extension of the trunk. The answer, if you really know sport, is very few. Sport is about core stabilization and hip rotation. Are the core muscles actually flexors or rotators of the trunk?

Functional anatomy has demonstrated that the primary purpose of the core musculature is the prevention of motion. In fact, noted physical therapist Shirley Sahrmann in her landmark work *Diagnosis and Treatment of Movement Impairment Syndromes* says, "During most activities, the primary role of the abdominal muscles is to provide isometric support and *limit* the degree of rotation of the trunk" (2002, 70). In much the same way, noted low back researchers James Porterfield and Carl DeRosa state, "Rather than considering the abdominals as flexors and rotators of the trunk—for which they certainly have the capacity—their function might be better viewed as *antirotators and antilateral flexors of the trunk*" (1998, 99). These two relatively simple thoughts totally changed my view on core training as I began to see the core muscles for what they really were rather than what I had been told they were in my 1980 anatomy class. Instead of seeing the muscles as trunk flexors and lateral flexors and prescribing exercises such as crunches and side bends, I now see them as antiextensors and antilateral flexors and more importantly can now envision a concept that has come to be called antirotation. Core training is really about motion prevention, not motion creation.

Over the past two decades strength and conditioning training has moved from a sagittal-plane orientation to an emphasis on unilateral training and multiplanar training. Part of this process, particularly for athletes, has been a misdirected push toward developing spinal mobility in rotation. Any athlete competing in a sport requiring rotation, such as baseball, hockey, and golf, was often blindly urged to develop more range of motion in rotation.

Like many other strength and conditioning coaches, I initially fell victim to this same flawed premise. I was one of the lemmings I dislike so much, blindly following the recommendations of others and using exercises I would now consider questionable or dangerous. Even as a back pain sufferer, I simply wrote off my discomfort as age related and continued to perform rotary stretches and rotary dynamic warm-up exercises.

The aforementioned Shirley Sahrmann (as well as others such as Stuart McGill and Phillip Beach) made me reconsider my position and eventually eliminate a whole group of stretches and dynamic warm-up exercises that were once staples of our programs. As Sahrmann stated in her book, "A large percentage of low back problems occur because the abdominal muscles are not maintaining tight control over the rotation between the pelvis and the spine at the L5-S1 level" (71). The lumbar range of motion that many personal trainers and coaches have attempted to create may not even be desirable and is in fact potentially injurious.

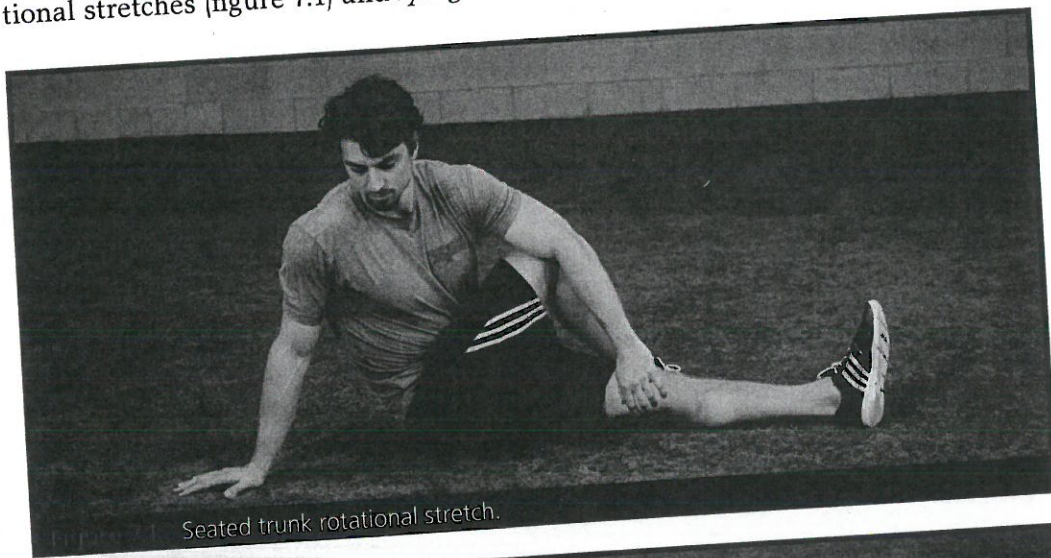
The ability to resist or prevent rotation may be more important than the ability to create it. Clients or athletes must be able to prevent rotation before we should allow them to produce it.

Sahrmann goes on to note a key fact I believe has been overlooked in the performance field. "The overall range of lumbar rotation is . . . approximately 13 degrees. The rotation between each segment from T10 to L5 is 2 degrees. The greatest rotational range is between L5 and S1, which is 5 degrees. . . . The thoracic spine, not the lumbar spine should be the site of greatest amount of rotation of the trunk." When a person practices rotational exercises, he should be instructed to "think about the motion occurring in the area of the chest" (61-62).

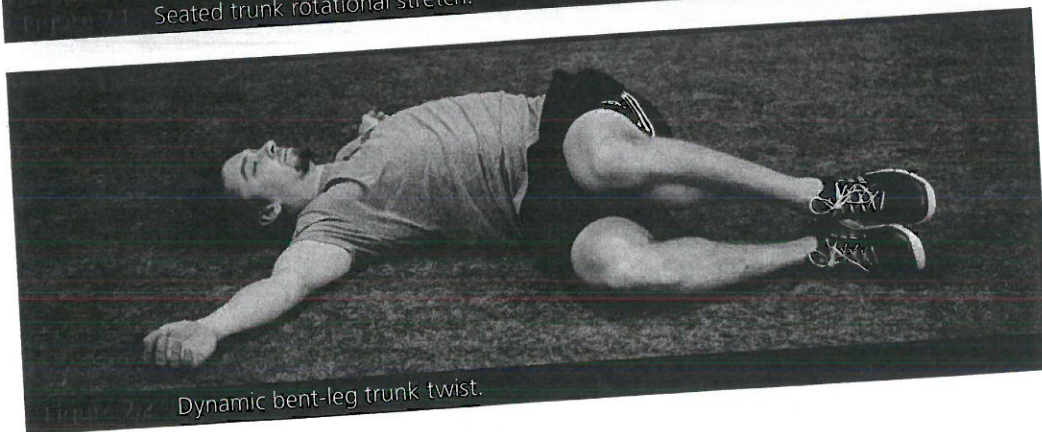
Sahrmann places the final icing on the cake with these statements: "Rotation of the lumbar spine is more dangerous than beneficial and rotation of the pelvis and lower extremities to one side while the trunk remains stable or is rotated to the other side is particularly dangerous" (72; see figures 7.1 and 7.2).

Interestingly enough, Sahrmann agrees with the conclusions of noted sprint coach Barry Ross. Ross recommends primarily isometric abdominal training for his sprinters. Sahrmann concurs: "During most activities, the primary role of the abdominal muscles is to provide isometric support and limit the degree of rotation of the trunk which, as discussed, is limited in the lumbar spine" (70).

What does all this mean? It means we need to eliminate stretches and exercises that attempt to increase lumbar range of motion. This includes seated trunk rotational stretches (figure 7.1) and lying trunk rotational stretches.



Seated trunk rotational stretch.

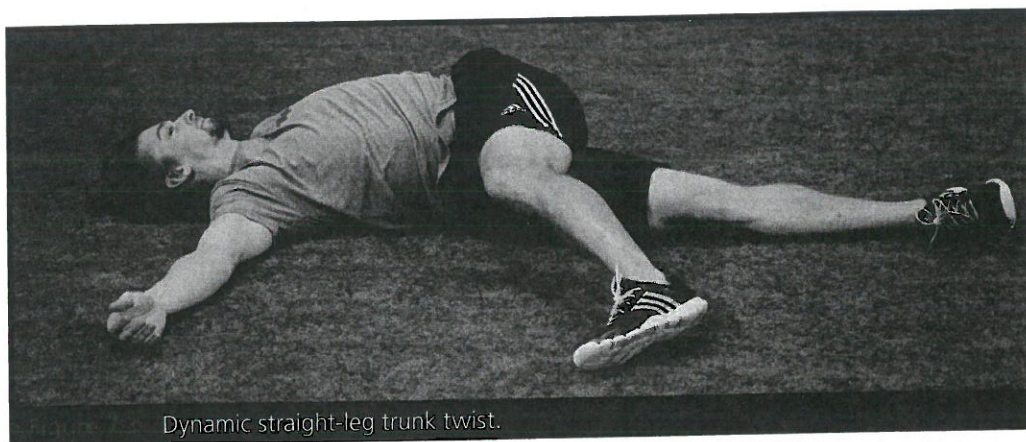


Dynamic bent-leg trunk twist.

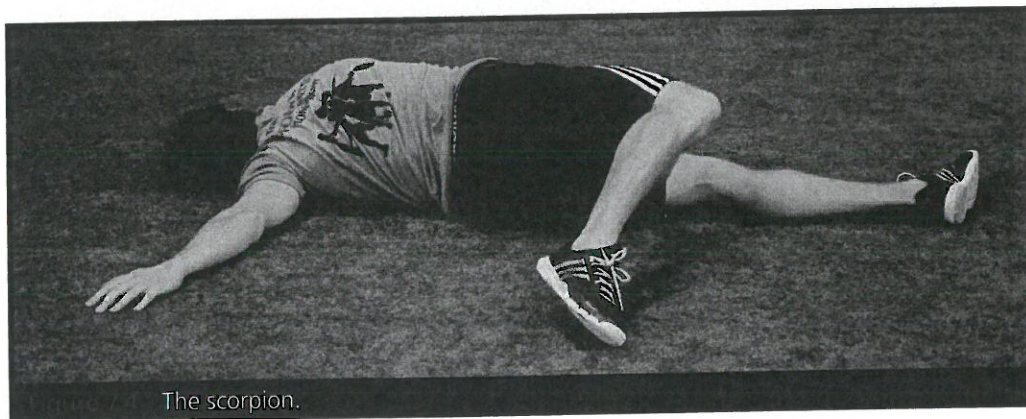
We must also eliminate dynamic exercises designed to increase trunk range of motion, such as the dynamic bent-leg trunk twist (figure 7.2), the dynamic straight-leg trunk twist (figure 7.3), and the scorpion (figure 7.4).

Most people don't need additional trunk range of motion in the lumbar spine. What we really need is to be able to control the range we have. We have seen a significant decrease in the complaints of low back pain since eliminating the exercises just illustrated. We now emphasize developing hip range of motion in both internal and external rotation.

In the future we will see coaches working on core stability and hip mobility instead of working against themselves by simultaneously trying to develop core range of motion and core stability.



Dynamic straight-leg trunk twist.



The scorpion.

## CORE TRAINING IN THE PROGRAM

The subject of when to do core work in the program is frequently debated. Those in favor of core work at the end of the training program cite the possibility of fatiguing the muscles important for stability before the workout. Some are in favor of doing core work before training at least partially to show its importance. The thought is that placing core work at the beginning of the workout establishes the core as a key area for sport training, sort of a first-things-first approach. In past years, that was the approach we favored. Our current approach is to place core exercises throughout the workout, almost as an active rest component.

The main thing is that core work be made a priority and placed intelligently into the workout where appropriate. Another important point to realize is that core work is not like maximal strength work. Many core exercises are isometric in nature and will probably do more to activate or upregulate muscles than to fatigue them. I like to think of exercises that activate or upregulate muscles like using a dimmer switch for a light. You are simply turning up the power to muscles that should be (and are) already working.

Core training may not work the "mirror" muscles as bench presses or curls do, but it is one of the keys to injury reduction and improved sport performance. Remember that a strong core has nothing to do with low body fat. Abdominal definition is the result of diet, not core work. Athletes might train the core muscles to help them shoot harder, throw farther, or stay healthy longer, but for the muscles they've developed to be visible, they need to watch what they eat.

## Core Exercise Categories

There are three basic classes of core exercises.

1. *Antiextension* is the primary function of the anterior core muscles and should be addressed in the first two or three phases of all programs. For decades we have developed the anterior core via flexion (bringing the shoulders toward the hips as in a crunch or sit-up, or the hips to the shoulders as in a knee-up or reverse crunch). We now realize that these muscles are stabilizers designed to maintain a stable pelvis under a stable rib cage and must be trained as stabilizers, not as trunk flexors.
2. *Antilateral flexion* develops the quadratus lumborum as well as the obliques as stabilizers of the pelvis and hips, not as lateral flexors of the trunk. Similar to the antiextension concept, varying isometric challenges are employed to work the lateral stabilizers.
3. *Antirotation* might be the key to core training. Antirotation strength is developed through progressions of antiextension exercises and through the use of diagonal patterns and rotational forces. The program contains no rotational exercises, such as trunk twists, Russian twists, or twisting sit-ups.

## Breathing and Core Training

The first edition of *Functional Training for Sports* leaned heavily on two sources when it came to guidelines for training the core: Paul Hodges and the Australian physical therapists, who initially gave us many of our stabilization concepts, and Mike Clark of NASM, who popularized the concept of drawing in. Since then there has been a long-running "who's right?" debate about core work, core stabilization, and the concepts of bracing and drawing in. Rather than getting tied up in that debate, I adopted a "whatever works, just get tight" approach and let the experts in academia compete to prove their particular theories right.

Then, in 2014, I was fortunate to meet a physical therapy assistant named Michael Mullin who was trained by a group from Lincoln, Nebraska, called the Postural Restoration Institute. Mullin's teaching offered a simple explanation of breathing, the process of respiration, and how it relates to the concepts of core training and core stability. This fundamentally changed the way we teach our core exercises. The key to understanding core training is realizing that the respiration process is not passive but active.