

Core Stabilization Background

A stable core is at the center, literally, of all health and dynamic function for the body. Without a stable core, it is impossible to enjoy an active life free of pain. Daily activities such as standing upright, balancing, dressing, doing chores all require a strong and dynamic core muscle group. In the clinic, I many patients who suffer from chronic low back pain. While there is sometimes a muscle injury, the most common reason for chronic low back pain that I have observed is lack of proper core strength, especially in patients 40+ years old. When speaking about the core, I also include conversations about the pelvis as this anatomical region is directly related to proper low back function.

Core training exercises and routines have been around for many years. The most famous kung fu martial arts temple in China, the Shaolin Monastery (少林寺; *shàolínsì*), is the cradle of Shaolin Kung Fu, also known as Shaolin Wushu (少林武術; *Shǎolín wǔshù*) and is known for extreme core muscular development. Think of the fictional character Chen Zhen, often linked to the famous Qing Dynasty martial artist, HuoYuanjia, that Bruce Lee played in the 1972 film Fist of Fury. The incredible body control demonstrated by Lee was a direct product of his immense core strength and stability.

For the purposes of this conversation, I'd like to define core stability as the muscular balance and control that is needed to keep the hips, pelvis, lumbar, thoracic and cervical spine in proper alignment and order (Giangarra et al. 2018). Muscularly speaking, the core is generally thought of as a cylinder where the abdominals make the front and lateral walls, the paraspinals and glutes make the back wall and the diaphragm and pelvic floor create the top and bottom of the cylinder, respectively. One key takeaway: core stability is a dynamic feature of the human body, meaning that if your muscles don't move together properly, core stability is limited. For the remainder of this article, we will discuss approaches to help ensure your muscles move dynamically through the middle of the human kinetic chain to improve your core stability and serve as an energy transfer link between the arms and legs.

What Causes Core Instability?

Within the core cylinder, the main muscles at the heart of any instability problem include the transverse abdominus (TA), the multifidi (posterior spinal muscles) that control the neutral, stabile position of the spine and offer segmental control, proprioceptive input and motion control feedback to the nervous system. On the top, the diaphragm fires in anticipation of shoulder flexion and concurrently activates with the TA and on the bottom, the pelvic floor is activated during lifting activities and helps support TA contractions. Recent research suggests (Giangarra et al. 2018) that spinal injuries occur in both fit and deconditioned patients and generally are linked to deficient endurance of trunk stabilizing muscle like the TA, multifidi, diaphragm, and

pelvic floor. Additional research suggests that motor control imbalances between the TA and multifidi and the global, large muscles (erector spinae and rectus abdominus) lead to a weaker core that demonstrates inefficient movements, altered postures and increased potential for macro and microtrauma injury to patients (Giangarra et al. 2018). Microtrauma injuries are the most well-known such as contusions, muscle strains, and tears and generally happen when a fracture or dislocation occurs. Additionally, when uncontrolled shear forces acting on the spine, the result is small, microtrauma injuries (think: spondylolysis and spondylolisthesis) that occur from muscle imbalances (Giangarra et al. 2018). For acute low back pain, diagnostic ultrasound measurements showed rapid multifidus atrophy, sometimes within 24 hours after injury (Giangarra et al. 2018), even in the case of well-conditioned, high-performance athletes! This finding points towards the need for a consistent, localized therapy plan for the core muscles to help rehab the multifidi. There are a wide range of low back disorders including generalized low back pain, disc injuries, facet and sacroiliac joint dysfunction, incontinence and respiratory disorders that can benefit from core muscle rehab (Giangarra et al. 2018)

Athletes Who Experienced Acute Low Back Pain

Many professional athletes and weekend warriors experience acute low back pain that derails their performance. Three well-known examples include Usain Bolt in 2010, Rafael Nadal in 2014, and Lionel Messi in 2016—and many others! On August 10th, 2010, [Tightness in Bolt's lumbar spine](#) limited his ability to generate power in his stride. After medical evaluation in Munich, he ended his 2010 season early to prevent further injury. He skipped the final Diamond League meets, focused on physiotherapy, and returned fully fit the following year. In the 2014 Australian Open final, early in the match against Stan Wawrinka, [Nadal felt a sudden lumbar spasm](#) that left him unable to serve or rotate normally. He needed on-court treatment and played the rest of the final in visible pain. He lost the final in four sets and spent several weeks in rehab before returning to the tour. On May 27th, 2016, [Messi took a knee to the lower back](#), suffered a sizable contusion and “intense pain,” and was substituted in the 64th minute. Team doctors ordered scans immediately after the match. He missed training for several days and was monitored closely but recovered in time for the Copa América.

Treatment Options

Conservative – First Line: Neuromuscular retraining

The basis for nearly every treatment program is neuromuscular retraining for the core (Giangarra et al. 2018). This is different from what many patients think they should do such as pure muscular strengthening. In fact, to generate effective core stability, we must use the neuromuscular system to coordinate contractions of the large and small muscles of the core. This system is muscular motor re-education process follows three clear steps: (1) muscular motor

skill training, (2) gentle return to light functional tasks and then, (3) movement towards fully loaded tasks (Giangarra et al. 2018). For this brief message, we will focus just on muscular motor skills training and explore light functional and fully loaded tasks in future messages.

Muscular Motor Skills Training: Abdominal Hollowing or Drawing-In

Begin in a hook-lying (supine, knees bent, feet flat) or quadruped position with your spine neutral. Place two fingers just inside and below each front hip bone so you can feel the deep abdominal wall. As you slowly exhale, gently “draw” your navel toward your spine—as if tightening a wide belt—while keeping your rib cage and pelvis still and continuing to breathe normally.

You should feel a mild, deep tension under your fingertips as the transversus abdominis (and pelvic-floor) activates, but the chest and outer abdominal muscles stay relatively relaxed. Hold this low-grade contraction for 5–10 seconds, relax, and repeat for 8–10 repetitions. Once the technique is comfortable, progress to seated, standing, or dynamic tasks while maintaining the same subtle hollow and free breathing. Regular practice of the abdominal drawing-in maneuver preferentially recruits the TA and internal obliques and has been shown to enhance spinal stability and reduce low-back strain.

Special clinical exercise note: if you find yourself moving the spine or pelvis during the contraction attempt, this means the larger (erector spinae, rectus abdominus) muscles are being recruited instead of the targeted local TA (Giangarra et al. 2018). The quadruped position is usually the best position to start learning this exercise.

Muscular Motor Skills Training: Plank Exercise

Set up prone with forearms on the floor, elbows directly under the shoulders, hands relaxed, and feet hip-width apart; brace lightly through the “drawing-in” cue you practiced earlier, squeeze the glutes, and press the floor away so your shoulder blades protract without shrugging.

Maintain a straight, neutral line from ears to hips to heels (no sagging lumbar sway or piking) while breathing steadily through the ribs. Aim to hold this isometric contraction for 10–30 seconds at first, focusing on quality activation of the transversus abdominis, multifidus, rectus abdominis, glutes, and scapular stabilizers. Rest briefly and repeat for 3–5 sets, gradually lengthening the hold or progressing to side-plank, straight-arm, or unstable-surface variations as control improves. Consistent practice of a properly aligned forearm plank enhances spinal stability, core endurance, and postural control with minimal compressive load on the lumbar spine.

Special clinical exercise note: Keep using the drawing-in guidance while doing the plank exercise. This helps to fully recruit the multifidi muscles. Imagine your back as flat as a table top for this exercise, if that helps visualize the correct position. If the full plank is too hard (you can't hold it for more than 15 seconds) start with the modified version where you are on your knees instead of your toes as in a knee push up position.

How Sports Acupuncture & Dry-Needling Accelerate Recovery

A short blurb about how acupuncture can help with low back pain: modern research shows that targeted needling techniques can calm pain pathways and jump-start the stabilizing muscles we've just discussed. Using small, single-use acupuncture needles inserted into the paraspinals (multifidi and lower portions of the erector spinae), glutes, or other key trigger points create a brief, controlled micro-injury that the body responds to with increased local circulation, rapid endorphin release, and a reset of over-active pain fibers—often producing measurable pain relief within minutes.

Functional MRI studies also demonstrate that needling modulates the same central networks responsible for motor control, helping the TA and multifidi “wake up” more quickly after acute strain. When we add low-level electrical stimulation (e-stim) to the needles—our sports acupuncture protocol—the effect can include deeper muscle recruitment and reduced muscle guarding, allowing patients to tolerate stabilization drills sooner and with better quality.

In short, strategic acupuncture and dry-needling act as a catalyst: they reduce acute low-back pain, restore muscle firing patterns, and make your exercise rehab more comfortable and effective.

Conclusion and Prevention

Fully preventing low back injuries is hard! However, consistent, well-rounded conditioning is the best safeguard against core instability: evidence syntheses show that low-load muscular motor-control drills such as abdominal drawing-in, bird-dog, side-plank, and other McGill-style stabilization exercises (described above) selectively recruit the transversus abdominis and multifidus and reduce future low-back symptoms when practiced three to five times per week.

You can also pair these with the broader resistance and endurance training targets that are in the American College of Sports Medicine's adult guidelines (greater than 2 non-consecutive days of full-body strength work plus ideally over 150 min of moderate aerobic activity weekly) to build global trunk and hip strength that supports spinal alignment under daily and sport loads.

Some final key take aways: progress exercises gradually from static holds to dynamic anti-rotation/anti-extension patterns (such as lifting an arm off the ground while planking) while maintaining neutral spine, rhythmic breathing, and glute engagement.

Add hip-mobility and posterior-chain strengthening (e.g., deadlifts, bridges) to balance anterior core focus and incorporate movement breaks and ergonomic lifts during work to minimize sustained flexed postures.

Focusing on targeted sports acupuncture and dry needling, neuromuscular activation, progressive resistance, aerobic fitness, and posture-aware lifestyle habits provides the most durable defense against core dysfunction and instability. If you are able to incorporate these suggestions, you might be able to prevent an acute low back injury and—possibly—start your journey to becoming a kung fu master!

References

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