Why Everyone needs Core Training

Stuart McGill

I have been working with back pained people and high performance athletes for over 30 years. If I were asked to choose the single most influential variable that links pain and performance enhancement, it would be an underperforming core. Why is this? What is the core?

Core stiffness is essential for injury prevention. Core stiffness is essential for performance enhancement. Core stiffness is not optimized in body building exercises. Core stiffness requires dedicated training.

A discussion of the core requires a 3-dimensional perspective. The spine is a stack of vertebrae that is asked to bear loads, yet it is flexible. A design engineer will tell you that you can't design a structure to be good at both. A steel beam that is straight and stood on its end is stiff, and can bear loads that try to compress, shear and twist it. So the beam can bear load but it can't move. A flexible rod that allows movement will bend and buckle under load, but absorbs shock. Our spines do it all - they bend and allow the lungs to fill with air, and even allow us to dance. The spine is this beautiful structure that is flexible and allows flowing movement, but requires a 3-dimensional guy wire system to stiffen and stabilize it when it is require to bear loads. Analysis of the muscular system, together with its associated fascia sheets reveals a clever guy wire system that creates balanced stiffness eliminating the possibility of buckling and injury. The concern is that modern living does not "tune" and train this guy wire system. In many people it lapses into complacency.

The greater the load that is placed down the spine, the greater the need for the musculature to stiffen the spine. How can this be? When muscles contract they do two things: they create force and they create stiffness. Stiffness is always stabilizing to a joint. Thus stiffness prepares the joint to bear load without buckling. Failure to appropriately stiffen is the biggest cause of joint injury, although not the only cause.

On the performance side, "Core Stiffness" is mandatory. It is absolutely essential to carry heavy loads, run fast and change direction quickly. It determines the rate of speed for movement of the arms and legs. There are those people who state they do not need dedicated core training because of they lift and squat. Yet when I assess their strength and speed abilities, often I find they are unable to use translate their strength to on-field performance. Pointing out their weak links brings them to the realization: Training the core is non-negotiable.

How does core stiffness enhance limb speed and strength? Consider the pectoralis major muscle – it attaches the rib cage at its proximal end, crosses the shoulder joint, and attaches at its distal end to the humerus of the upper arm. When muscles contract they try to shorten. Consider the specific action here – the arm flexes around the shoulder joint moving the arm from muscle shortening at the distal end. But the same shortening also bends the rib cage towards the arm at the proximal end of the muscle. Thus simply using the pec muscle would not result in a fast nor forceful punch. Now stiffen the proximal end of pec muscle attachment – meaning stiffen the core and ribcage so it can't move. Now, 100% of pec muscle shortening is directed to action at its distal end producing fast and forceful motion in the arm. In

the same way a stiffened core locks down the proximal ends of the hip muscles producing fast leg motion. A loss of core stiffness causes the torso to bend when sprinting, and a loss of speed - some force was robbed that should have been expressed in leg velocity. Thus, a universal law of human movement is illustrated – proximal stiffness enhances distal mobility and athleticism.

Consider a 340 pound NFL lineman, who is strength trained in the weight room on Olympic lifts and power cleans. His coaches believe he is well trained. Yet the athlete has back pain that limits training. Measuring his cutting speed – the ability to take 5 fast strides forward, plant a foot and cut to the right reveals his great weakness and strength imbalance. The pelvis drops on the swing leg side and the spine bends laterally. He reports a twinge of pain. All of his strength training has been performed with two legs on the ground. All of the pulls, lifts and presses never trained the core in 3-dimensions. The weak link is limiting his performance and causing stress and pain. Addressing this with loaded carrying exercises produced more lateral spine stiffness in his core. His pelvis and spine produce appropriate proximal stiffness (proximal to the hip joint) so that more velocity of all of the muscles that cross the hip joint go to the distal side of the joint resulting in faster leg speed. Further, the spine does not bend, the stress concentration at the joint is eliminated and the pain is gone. This example demonstrates that the hip muscles were limited by a weaker lateral core. Specifically, the gluteal muscles on the stance leg were confined by the lateral core muscles on the swing leg side of the body – in this case the lateral obliques and quadratus lumborum. Good training always addresses the elements that assist and potentiate one another throughout the body linkage. The core is home base.

Proximal stiffness, or stiffening the core between the hip and shoulder joints produces higher limb speed and force. Strike force in MMA or baseball or golf, is governed by this universal principle. Limb speed for throwing, running, and directional change is a fundamental athleticism. While proximal stiffness (the core) governs all of these athletic objectives it also reduces back pain and injury by reducing the spine bending when loads are imposed. The spine loses its load bearing strength as it is bent more away from its neutral posture.

So now we can answer the question – what is the core. Proximal stiffness occurs between the ball and socket joints – ie. the hips and shoulders. It involves all of the muscles in the torso. They function primarily to stop motion. They should be trained this way. The core also involves the muscles that cross the ball and socket joints that have distal connections – psoas, the gluteals, latissimus, pecs, etc.

There are many ways to train these in progressions to enhance performance and injury resilience. I have described these in my book, “Ultimate back fitness and performance” (www.backfitpro.com). Every person will have different requirements – hence each person will need guidance in how to create the best program for themselves.

Still not convinced that dedicated core training is mandatory? The most essential of human movements is the ability to walk. Children with paralysis of quadratus lumborum can hardly walk. The pelvis, if not stiffened to the lumbar spine with quadratus contraction, simply bends laterally so that the torso collapses with the stance phase of the walking cycle. Quadratus is an essential core muscle forming the lateral core. Some of us have enough athleticism such that extra training of the Quadratus is not

necessary. But the NFL lineman needs to train it to change direction quickly on the gridiron – ensuring that the lateral core is up to the job of creating a stiff base so the hip muscles can explode producing maximum cutting speed.

A final thought addresses the universality of core training. The exercise progressions that our scientific work has justified over the years to reduce the risk of back injury, and to enhance performance, are very similar to the progressions shown to reduce the risk of groin injury, sportsman's hernia and knee injury, particularly to the ACL. All of us working in these areas converged on the same conclusion. No one can afford to neglect this building block of function. Core training to enhance stiffness is the foundation, the underpinning of one of the most fundamental laws of human motion.