



### *The Athletic Core*

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So what exactly is “the core”? It is more than just a six-pack that many people envision. The core consists of the rectus abdominus, obliques, transverse abdominus, latissimus dorsi, hip flexors, diaphragm, pelvic floor, and the gluteal muscles.

Think of the body as a long connective chain with each muscle group representing a link in the chain. The core muscles are simply the middle links within the chain. The middle of the chain must be strong and stable during athletic movements.

The core muscles work to produce and transfer force from one part of the body to another during athletic movements. It also acts to stabilize the midline of the body during movements that require a high degree of balance and body control. In regards to the “six pack” muscles (rectus abdominus); these muscles simply flex the torso in the sagittal plane. However, the core muscles also extend, laterally flex, and rotate the torso during athletic movements in all three planes of motion.

### **The Core In Action**

The core musculature plays an important role when trying to spike the ball over the net in volleyball. As a volleyball player approaches the net, she begins to lower her center of gravity by semi-squatting and then maximally jumping as high as possible. The lower body initiates the movement followed by rotation of the core and shoulder girdle. Energy is transferred along the kinetic chain from the lower body and core to the shoulder and arm. Once the core and shoulder muscles have maximally lengthened (rotated) then they contract to produce a smooth powerful strike at the ball. If the athlete is not able to transfer energy from the ground through the

legs/hips, through the core, to the shoulder and out through the arm then ball will have considerably less velocity after she strikes the ball. It is extremely important that the athlete lengthen the muscles of the core (by rotating) and shoulder girdle so that those same muscles can forcefully contract to strike the ball with as much power as possible.

A baseball pitcher requires a large amount of core strength and stability to throw a pitch off the mound. The pitcher generates force by pushing up the mound with his legs and hips. This energy is then transferred through the core to the muscles of the shoulder girdle, then through the arm until the pitcher releases the ball. As a pitcher rotates his entire body around the core, these muscles are lengthening and then quickly contract to produce a smooth and powerful movement. In this example, the core is an important link between the lower body and upper body. If there are any weaknesses or energy leaks within the kinetic chain then the pitcher will not have the same velocity on the ball and may risk injuries. Many times the shoulder or arm is injured because the legs or core (links in the chain) are weak or do not function properly and cannot produce/transfer energy to the upper body. In this case, there is greater strain placed on the muscles/tendons/ligaments in the shoulder and arm to maintain velocity on the ball.

### **Core training**

A core workout should not consist of lying on your back doing a hundred different types of crunches and sit-ups. This is a great way to develop the rectus abdominus and help get that six-pack look (of course with the proper diet and cardiovascular program). However, this is not the most functional way to train the core and these exercises transfer very little to sport movements. Core training should take place in an upright position (both feet or one foot), in all planes of motion, through full range of motion and at different speeds. The chop is a perfect example of a sport specific core exercise that transfers to sport tasks. This exercise can be performed with different stances, angles, equipment, and speeds. There are times when remedial core exercises are important for the development of a solid base of strength. These exercises would include bridging variations in a prone, supine, or lateral position. My athletes always do bridges by stabilizing the core while moving the distal limbs (legs, arms or both at the same time). Sports movements require core stabilization while the arms or legs are in motion, so these bridges become more sport specific than simply holding a static bridge position for an extended length of time.

Other great core exercises that should be incorporated to an athletes training program is medicine ball drills. Medicine ball exercises can also be executed in different stances and with different speeds (weight of the medicine ball). Many of the medicine ball exercises such as shot put throws and lateral tosses are done to enhance rotational core strength. Both of these exercises require the core to transfer power from the core out through the arms.

It is important to understand that many functional exercises train the core muscles without isolating them. Standing exercises such as squats, lunges, Olympic Lifts, and shoulder presses engage the core the musculature. In addition, other functional exercises such as push-ups and inverted rows require a great amount of core stabilization to complete the exercise.

### **Summary**

The core is an important link between the lower and upper body and helps to produce and transfer energy. It is important to understand the role of the core during athletic movements and how to design a strength training program based on the function of the core. The key is that the majority of your core training program should take place in an upright position, in all planes of motion, through the full range of motion, and at different speeds.