

Thus, training the underlying deeply placed core muscles is not accomplished through high-intensity core strength workouts and training systems. Rather, the stability and control of position in the joints are the initial and primary focus for building the foundation of better technique. During movements, experienced triathletes generate force from inside the body (the core) to the extremities (limbs). Beginning or less stable triathletes (at any level) might tend to move in the opposite manner (from outside in). When this occurs, movements are less forceful, appear uncoordinated, and require more energy over time to sustain. Elite and Olympic triathlon coach Darren Smith of Australia explains, "Triathletes with nonswimming backgrounds must learn how to stabilize the body through swiveling and a pivoting of the hips in connection with the placement of the hand in dense, still water. Our triathletes learn how to improve the activation of the core by swimming with bands holding the ankles together. If the athlete uses the arms only, they will sink. The athlete must learn to connect the hips and thus, the core." With enhanced stability at the deep core, you gain the ability to accomplish, maintain, and preserve posture and thus to apply better technique. Core stability at the local level can greatly enhance your capability to achieve maximal stability for longer periods of time and reduce injury caused by movement compensation as a result of an unstable core and postural muscles. Again, high-intensity core training works the superficial muscles and not the deep-layered stabilizers. Those are the most important for triathletes to concentrate on.

Dynamic Posture

The upper and lower extremities can contract, accelerate, and decelerate in a graceful display of motion. The more stable the proximal (center) core musculature, the more efficient the distal (away from the center) body movements of the extremities (arms, legs, and head). Triathletes and Ironman world champions Mirinda Carfrae and Chrissie Wellington are superb examples of core stability (neutral

spine and pelvic control) when running. A stable triathlete is balanced, and the displays of force are moving the body forward with extraordinary proficiency. Gravity gives the impression of abandonment as the runner floats horizontally forward with exceptional running motion. Propulsion is remarkably functional, powerful, and stable at each stride. For example, observe the pelvis and hips of a runner with an imagined box or rectangle providing an indication of core stability. With the upper parts of the box over the pelvis, a neutral (normal) pelvis and hips remain level and inside the box (figure 5.2). Excessive rotation of turning motions, forward tilting (accompanied by low-back arching), and elevation of the hip are movement compensations signaling lack of control in the pelvic, hip, and lumbar spine segments.

At the joint level, the body moves along several planes simultaneously—all functional movements are in three dimensions. The pelvis, for example, is the central nexus between the spine and the lower extremities. For the triathlete, stability is vital for posture, force, power generation, and the positions that make up efficient technique. The goal



FIGURE 5.2 Triathlete with a neutral pelvis.

Multifidus

One of the most important stabilizers of the spine, the multifidus is key in controlling position and stiffness of the spine. This very thin muscle is the deepest-layered muscle of the back. The multifidus plays an important role in preserving posture in swimming, cycling, and running.

The multifidus attaches at the sacrum, the triangular bone at the base of the spine that joins the hip bones forming the pelvis. The multifidus fills the grooves on the sides of the lower vertebrae and functions to extend, rotate, and laterally bend the spine. Signs of weakness in the multifidus include chronic low-back pain and lumbar or thoracic kyphosis (arched low back and rounded upper spine).

Testing Multifidus Stability

Test the stability of your multifidus with this quick self-test. Lie face down with a small pillow under your lower abdomen. Breathe normally and maintain maximum cervical flexion (flexed neck) and gluteal muscle contraction (for pelvic stabilization) while holding sternum off the floor (see figure 5.11). Termi-



FIGURE 5.11 Multifidus stability self-test.

nate the test if you cannot keep your sternum off the floor, if you have pain, or after two minutes (for females) or three minutes (for males). If you held the contracted position for two minutes (for females) or three minutes (for males), your multifidus is stable and strong. Holding the contracted position for under 90 seconds (for males) or under 60 seconds (for females) indicates a weak, unstable multifidus with likely accompanying low-back pain.

Multifidus Exercises

Exercises for the multifidus result in these benefits:

- Improved stability and activation in back extensors
- Improved bracing of the abdominals and a neutral spine
- Improved control of maintaining neutral joint positions
- Improved performance of the abdominal muscles
- Improved control of the spine by preventing rotation
- Improved balance control
- Improved ability to control the pelvis
- Improved lateral bending and extension

See table 5.3 for the progression of sets and reps. Once you have achieved ACES at one stage, move to the next stage.

External and Internal Obliques

The external obliques (EO) are the largest abdominal muscle, curving around the lateral and front sides of the ribs. This muscles flex the trunk, control or prevent forward pelvic tilt, elevate the pelvis, and rotate the torso. They are also important accessory muscles during expiration and elevate the diaphragm muscle. The internal obliques (IO) are the upper-abdominal muscles; they are smaller and thinner than the EO and lie under the lateral wall of the abdomen. The IO primarily flex the spine but also assist in lateral bending, rotation, and elevation of the pelvis. They are also active during expiration and for the elevation of the diaphragm muscle. The IO are commonly exercised abdominal muscles (via trunk curls or sit-up crunches with legs extended), which can cause overtraining in the IO and rectus abdominis, leading to muscular imbalance (shortening) in the EO.

In both the EO and the IO, moderate weakness decreases the efficiency of respiration (forced exhalation). With weakness on both sides of the external obliques there can be forward tilting in the pelvis. And when tightness of EO and IO is present there can be a swayback posture with pelvis tilting forward and thorax (area between neck and abdomen) positioned back.

The obliques together with the transversus abdominis control and contain the entire abdomen and thus are important for spine stability for triathletes.

Signs of weakness in the external and internal obliques include swayback posture and posterior pelvic tilt.

Testing External and Internal Oblique Stability

Test the stability of the external and internal obliques with this quick self-test. Lie on back with knees and feet extended; place fingertips behind the ears, lightly touching. Perform a



FIGURE 5.18 External and internal oblique self-test.

sit-up with trunk, neck, and head aligned and elbows pointed away from body (figure 5.18). Common signs of weakness are a curled trunk, arched back, flexed head, and elbows pointed toward feet.

Exercises for External and Internal Obliques

Exercises for the external and internal obliques result in these benefits:

- Improved respiration and support of abdominal intestines
- Improved rotation stability of the vertebrae
- Improved elevation of the pelvis (neutral stabilization)
- Improved control of flexion of the trunk and spine
- Improved control of posterior pelvic tilt during movement of the lower extremity (reducing compensations in movement)

See table 5.3 for the progression of sets and reps. Once you have achieved ACES at one stage, move to the next stage.