PHASE 1: STABILITY AND MOBILITY TRAINING

ACE
AMERICAN COUNCIL ON EXERCISE

Introduction

When building a house, it is essential that you have a solid foundation to support the structure placed on it. The human body is no different. Muscle imbalances, postural issues, and improper movement mechanics jeopardize our structure and hinder our movement potential.

For these reasons, stability and mobility are the cornerstones of efficient human movement. By developing these attributes, an individual's ability to accommodate, control, and redirect the forces and stressors placed on the body is significantly enhanced. This not only sets the stage for better performance in life and sport, but also improves the resilience of the musculoskeletal system and may reduce one's risk of injury.

The primary goal in phase 1 of the ACE Integrated Fitness Training® (ACE IFT®) Model is to develop, or reestablish, the appropriate levels of mobility and stability required to produce efficient human movement. Regardless of how fit an individual may appear, it is very likely that he or she has deficits in either, or both, of these qualities. In many cases, individuals simply learn to accommodate for these limitations by performing compensatory movements in order to complete a task. Unfortunately, over time these compensations may not only lead to suboptimal performances, but actually facilitate injury. Therefore, phase 1 is designed specifically to address these issues and create a solid foundation to enhance and promote overall quality of movement by developing the stability–mobility relationship within the kinetic chain.

The Stability-Mobility Relationship

Mobility can be defined as the ability of a joint to move freely without significant physical hindrance. In contrast, stability may be simply defined as resistance to movement. Though these concepts appear diametrically opposed, a complex synergistic relationship exists between these two qualities. In order to produce efficient movements at the joints, there must be a base of stability (i.e., anchor point) that allows the appendages to travel through their intended ranges of motion, at the required velocities, without undue restriction. This relationship ties directly to the concept of the "kinetic chain." Essentially, this concept is used to illustrate the synergistic nature of human movement. In general terms, the kinetic chain concept states that each joint is one of a series of links in a chain. When one link in the chain is functioning improperly, it alters the functioning of each subsequent link. Consequently, if either mobility or stability is inadequate, movement may be compromised and the kinetic chain may not function in an optimal manner. A basic illustration of this relationship is presented in Figure 1.

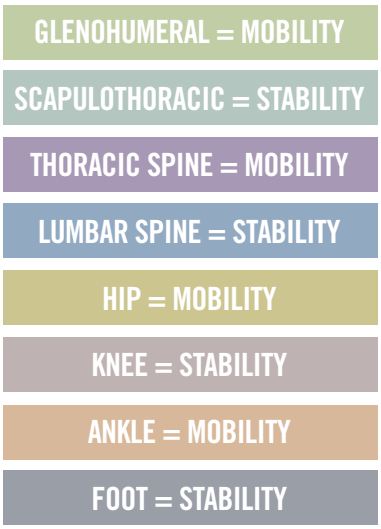

Figure 1
The Stability-Mobility Relationship

Previous injury, habitual movement patterns, and repetitive stress may lead to a variety of anatomical constraints that may affect mobility and stability throughout the kinetic chain. Ultimately, if joint stability is compromised, the muscles that typically allow the joint to mobilize must act as stabilizers. This alters the joint's intended function and places more stress on the body's various systems and subsystems. For this reason, the first step in the ACE IFT Model is to ensure adequate proximal stability in the trunk is developed to withstand the stressors placed upon it during both exercise and basic activities of daily living.

Developing Proximal Stability

In order to produce efficient movement, lumbar stability is essential. The lumbar spine provides an anchor point that allows more efficient movement of the extremities. If stability throughout the lumbar spine is inadequate, the movement above and below this area must then take on the role of stabilizers to make up for the deficiency. Therefore, it is essential that clients learn to activate the muscles that surround the lumbo-pelvic-hip area prior to engaging in more advanced resistance-training programs and activities. Subsequently, during the first stage of the ACE IFT Model a great deal of emphasis is placed on teaching clients to activate the muscles that surround the lumbar area of the spine via active isolation of the core musculature.

The transverse abdominis (TVA) is the key muscle that works reflexively with the neural system to produces what is known as the "hoop tension" effect. This action is similar to tightening a belt around the waist. By efficiently activating the TVA, intra-abdominal pressure around the spine is increased. This increase in pressure helps stabilize and protect the spine against various loading forces. As previously mentioned, the increased rigidity in this area also helps create a solid platform, or anchor point, for movement at the joints above and below the lumbar spine. If an individual is unable to stabilize the lumbar spine, the thoracic spine and hips will take on a greater stabilization role. This reduces the amount of mobility the thoracic and hip joint are able to allow during a movement, and may potentially lead to injury in the long term. Without the ability to effectively control and stabilize this region of the body, performance during later phases of the ACE IFT Model will suffer. This will most likely hinder a person's ability to reach his or her full movement potential, and increase injury risk in the long term.

The first step in phase 1 of the ACE IFT Model should be to select exercises that emphasize isometric activation of the core muscles. These exercises serve several purposes in the development of a training program. First, they allow the trainer to corroborate suspicions he or she may have had about faulty movement patterns performed during the pre-exercise movement screen. In other words, if the trainer suspected the reason for the client scored poorly on one of these screens was poor trunk stability, these exercises may further build a case for this assumption and help guide exercise selection and progression in future sessions. Secondly, once these exercises are mastered, they can be used to reinforce proper neuromuscular activation during dynamic warm-up sessions to prepare these muscles for the forces they will encounter during the training session.

The following exercise menu (Table 1) provides a few sample exercises that can be used to address stability in

Table 1: Exercises for Developing Proximal Stability of the Lumbar Spine

Exercise	Basic Description	Technique Cues	Progressions/Regressions
Abdominal bracing	While in a supine or prone position, isometrically contract the abdominal and lower-back muscles.	• Act like you are tightening a corset. • Pretend you are getting ready to take a punch in the stomach. • Contract the muscles around the stomach/pelvis as if you are trying to interrupt the flow of urine.	• With the client's palms turned upward, instruct him or her to make two fists, then lightly tap the abdominals using each fist on either side of the umbilicus.
Glute bridges	While in a supine position with the palms turned up, knees bent, and feet flat on the floor, lift the hips so that the trunk, center of the hips, knees, and shoulders are in alignment.	• Lift the hips by contracting the glutes. • Keep the trunk as stiff as a board. • Keep the shoulder blades retracted and depressed. • Do not hyperextend the back, as this places increased stress on the lumbar spine.	• Fully extend the arms out and position the hands directly in front of the chest with the palms facing one another. This increases the stability demands on the trunk, as the arms can no longer be used as supports. • Without bending the knees, place the feet on a stability ball, then lift the hips so that the center of the ankles, knees, hips, and shoulders are in alignment. This can be cued sing the phrase "stiff as a board from head to heels."

Continued on next page

Table 1: Exercises for Developing Proximal Stability of the Lumbar Spine *(continued)*			
Exercise	**Basic Description**	**Technique Cues**	**Progressions/Regressions**
Quadruped	Assume a quadruped position with the hands directly under the shoulders and the knees under the hips.	• Keep the trunk as stiff as a board from the head to the glutes by bracing the trunk. • The slope of the spine should be close to parallel with the floor. • Do not allow the hips to drop or back to sag.	• Raise one hand approximately 1 inch off the ground. While maintaining trunk stability, perform the following shoulder movements over a distance of approximately 6 to 12 inches. ✓Flexion/extension ✓Abduction/adduction ✓Circumduction • Raise one knee approximately 1 inch off the ground. While maintaining trunk stability, perform the following hip movements over a distance of approximately 6 to 12 inches. ✓Flexion/extension ✓Abduction/adduction ✓Circumduction • Raise one knee and the opposite hand approximately 1 inch off the ground. While maintaining trunk stability, perform simultaneous movement in the same plane with both limbs, or in alternating planes. • This exercise sequence can be regressed by allowing the individual to perform these same actions while lying in a prone position on the floor.
Front plank	Lie prone on the floor with the feet dorsiflexed and approximately hip-width apart. The forearms should be in full contact with the ground. While keeping the back flat, lift the body off the ground until there is a straight line between the center of the ankle, knees, hips, and shoulders, and the entire weight of the body is resting on the forearms and toes.	• Brace the core. • Activate the glutes to initiate the lifting of the hips.	• This exercise can be progressed by raising one leg 2 to 3 inches off the ground, or by lifting one arm and extending it in front of the body. During both of these variations, rotation of the hips or trunk should not be allowed. • This exercise can be regressed by allowing the individual to perform this exercise in a modified push-up position with the knees on the floor, or by elevating the hands on a bench.
Side plank with bent knee	Lie on the side with the knees bent, legs stacked on one another, and the elbow bent directly under the shoulder. Keep the head aligned with the spine, lift the hips, and isometrically stabilize the trunk.	• Pretend the hips are being pulled up toward the ceiling. • Activate the glutes to initiate the hip lift.	• Perform the side plank with the legs straight.

the lumbar spine. Many of these exercises can be found at www.acefitness.org/acefit/exercise-by-bodypart/. These exercises should be progressed from those that are more supported, such as those in which the trunk is in contact with the ground (e.g., the bracing exercise), to those that are less supported (e.g., the quadruped series). For individuals who are especially deconditioned, these exercise, along with some basic flexibility training, may initially make up the majority of their exercise training program. However, as individuals become more proficient at stabilizing the lumbar spine, two or three exercises per workout should be selected to improve neuromuscular activation prior to engaging in a dynamic warm-up. Each of these exercises should be performed for approximately one to two sets of 10 repetitions using slow and controlled movements through the full suggested range of motion for the exercise, then holding each isometric action for approximately two or three seconds.

Once the client understands how to activate the TVA and the concept of bracing via exercises aimed at improving proximal stability, the trainer can move on to the second step in this phase, which is improving proximal mobility of the thoracic spine and hips. However, it is critical that proximal-stability training precedes proximal-mobility training to optimize results. For more information regarding training for proximal mobility, as well as more information about the ACE IFT Model, refer to the *ACE Personal Trainer Manual,* 5th Edition.