The word “plyometrics” is not found in the dictionary. Yet it is a word that has special meaning to athletes or all who work with them. The word was coined by an American track & field coach while observing some Eastern European athletes going through their jump training regimens. Plyometrics comes from the Greek plio, meaning “more,” and metric, meaning “to measure.” The literal translation would be “measurable increases.”

Many athletic trainers and therapists have found that the system of plyometric training complements their rehabilitation program in a way that enables athletes to develop speed as well as strength in their movements. The athlete’s ability to develop power is enhanced, which leads to improvements in performance and rehabilitation. This paper will introduce you to the concepts of plyometrics. The other articles in this series will focus on plyometric exercises that are specific to certain areas of the body.

For athletic trainers or therapists who seek to use plyometrics as part of their rehabilitation or reconditioning of athletes recovering from injury, it is important to understand how this exercise system came about. Besides knowing the physiological and biomechanical basis for implementing such exercises, one must have an appreciation for the art of designing a program specific to the needs of the athlete. In order to design an effective program, one must understand the process of reducing a plyometric exercise in terms of intensity and volume so as to better meet the needs of the rehabilitating athlete.

This section will deal with the overall scope of plyometric exercise, but it is up to the athletic trainer or therapist to employ a range of exercises that will lead into the larger efforts more often associated with maximal conditioning regimens.

The physiological basis for plyometric training lies in the fact that muscles have a natural tendency to rebound when stretched rapidly. This ability comes from mechanoreceptors within the muscles that are sensitive to stretch and length at any point in time. This ability to rapidly contract and develop larger-than-normal forces has been called the “stretch-shortening cycle” of muscle contraction.

The main objective of plyometrics is to convert the elastic energy provided by loading the muscles with body weight and the force of gravity during an eccentric muscle contraction into an equal or greater opposite force during the subsequent concentric contraction. This reversal of muscle action is known as the amortization phase of the stretch-shortening cycle. It can be viewed as the cocking phase an athlete

**KEY POINTS**

- Plyometrics can be easily adapted to various training and rehabilitation programs, as long as the athlete has a base of strength.
- Plyometric training is based on the fact that muscles tend to rebound when stretched rapidly.
- An effective plyometric rehabilitation program adjusts the volume and intensity of exercise to meet the needs of the athlete.
goes through prior to the starting phase of virtually any activity. When the amortization phase is brief, it is conducive to developing power and speed of movement. Plyometrics are most effective when the athlete develops brief ground or surface contacts during sport movements.

Plyometric training develops physical characteristics that are common to all good athletes, which is why it is such an important part of a sport rehabilitation plan. Movement time is shortened and the athlete becomes quicker at starting and changing direction. The athletic trainer or therapist can recognize efficient loading of the muscles of the lower extremities by listening to the sound the athlete makes when landing during this type of drill. It can be characterized as crisp, quick, or light and is an important quality of movement that should characterize the execution of all plyometric drills. If the athletic trainer or therapist is supervising the athlete’s rehabilitation, he or she should watch for the return of this quality of movement to indicate progress in the recovery process.

Among the many benefits of plyometric training is the flexibility and adaptability of plyometric exercises to various training and rehabilitation programs. The Europeans largely thought of jump training as affecting only the lower extremities. Lower body plyometrics are generally divided into five categories: jumps in place, standing jumps, multiple jumps, depth jumps and box drills, and bounding. Specific drills can be used for a specific sport that combines elements of these five types (e.g., a depth jump with rebounding a basketball).

Plyometric principles can apply to upper body movements as well. The medicine ball has proven to be an effective means of providing plyometric stimulus for the upper extremities. Using the medicine ball in such a way that it is caught and then released quickly from the hands can create the stretch-shortening cycle in the arms, chest, and back. “Catch and throw” moves that cause the body to rotate the trunk will do the same for that area. Push-up movements can be used to literally “jump” from the floor on the hands.

**Side Throws—Plyometric Exercises for the Trunk**

Exercises with the medicine ball can be performed plyometrically if certain criteria are met. In the example shown here, the athlete catches the ball at a point just above the knees.

As he catches the ball, he lets the weight of the ball rotate his body at impact. As the ball rotates the upper torso, the muscles of the trunk are placed on stretch. This enables the “plyometric effect” of rapid stretching of the muscles and connective tissue to set up a rebound effect.

As the torso reacts to the rapid stretching, elastic energy is once again stored within the muscles.

As the athlete begins to return the ball to his partner, the stored elastic energy is utilized to develop force so as to return the ball rapidly to the partner.

In this way, an athlete can develop many opportunities to capitalize on the plyometric effects of throwing and catching a medicine ball. These opportunities can be developed into a format of sets and repetitions which become part of a complete exercise training program.