

Plyometrics

Plyometrics are fast, powerful movements used in athletic training, used to improve muscular power and the nervous system. Often they are used to improve performance in a specific sport, however, the benefits extend beyond sports. Plyometrics combine strength, elasticity and stimulation of muscle and surrounding tissue to aid in jumping higher, throwing farther and harder, changing direction faster, etc.

The goal of plyometrics is to create as strong a muscle contraction possible in the shortest amount of time. A contraction involves an initial rapid movement, followed by a short reduction phase, then a quick, explosive movement, which enables the interactive muscles to engage in a trained reflex during the stretch cycle. This ability to generate an incredible amount of force quickly aids in both muscular and neurological development, but does so without necessarily increasing strength output. In other words, athletes who practice plyometrics learn how to jump higher, hit harder, throw faster, etc. by contracting muscle quicker, not harder. This allows athletes to repeat the same movements over and over again without having to “muscle” their way through them, which can wear the muscles out and can cause injury. Animals often take advantage of this concept as well. For example, if a kangaroo depended solely on muscle strength to move around, it would not be able to jump as high or as long and would tire often.

Muscular power, which is the goal of plyometrics, is determined by the time it takes strength to be converted into speed. In order for muscles to cause movement, they must shorten, which is known as concentric contraction. However, when a muscle is lengthened prior to contraction, known as eccentric contraction, a force is produced through a storage of elastic energy. The quicker the transition, the more powerful the force.

The neurological component of plyometric training involves an improved sensory response of the muscle spindles and golgi tendon organs (GTO). During plyometric training, the capacity of the GTOs to become excited increases, thus decreasing the chance for them to send signals to limit force production of the muscle. This allows a greater force reaction than normal strength training would allow.

Some safety concerns to consider before training are age, weight, surface area, footwear and technique. Most people can practice plyometrics to some extent, although seeking the help of a qualified trainer is encouraged. Plyometrics are not dangerous, but high intensity and stress on the joints can cause injury when done incorrectly. Low-intensity versions exist, which are often used in rehabilitation circumstances.