

# The Ability To Balance When Fatigued

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PROPER STRENGTH IN THE muscles surrounding the knee joint can assist in function and stability as well as in injury prevention. The role of the strength and conditioning professional is to educate and condition athletes and clients in order for them to perform well and with minimal risk of injury, even when fatigued.

In this study, Johnston et al. (1) tested the effect of lower-extremity muscular fatigue on motor control performance. Twelve men and eight women (average age, 29 years), none with a history of lower-extremity injuries, were tested on an instrumented balance assessment system. Although none were members of a collegiate athletic team, most did participate in some form of physical activity at least 3 times a week. The subjects were instructed to keep the balance platform as level as possible while standing barefoot with knees slightly bent and arms folded across the chest while looking forward.

Several different balance tests were administered before and after exercising to fatigue: (a) a

unilateral test with each lower limb, (b) a bilateral static test, and (c) a dynamic balance study in which the subject moves the platform in a circular direction to "chase" a moving point on the computer screen. After the initial set of testing, the subjects were fatigued according to readings from an isokinetic dynamometer. This fatiguing exercise consisted of 1-minute exercise intervals at several different levels with no rest between intervals. Following the isokinetic exercise, the subjects were immediately retested on the balance assessment system.

Statistical analyses demonstrated significant differences between pre- and postfatigue scores, pointing out that fatigue significantly decreased the ability of the subjects to balance on the balancing device. Specifically, the unilateral and bilateral static tests demonstrated worsening of balance skills. Although no significant results were found in the final, dynamic limb test, the test did show decreased motor control after fatigue. The overall data clearly support the hypothesis

that fatigue can decrease balancing ability. This information supports the notion that fatigued athletes may be at increased risk of injury.

As strength and conditioning professionals, it is our responsibility to train athletes and clients and to precondition them to delay fatigue and assist in the prevention of injury. This study showed that by properly conditioning the lower extremities, we can strengthen the muscle groups surrounding the knee and therefore reduce the risk of injuries to this joint. This is particularly true for the anterior cruciate ligament, which most frequently gets injured at the end of a sporting event when a participant is fatigued. ▲

## ■ Reference

1. Johnston, R.B., M.E. Howard, P.W. Cawley, and G.M. Losse. Effect of lower extremity muscular fatigue on motor performance. *Med. Sci. Sports Exerc.* 30(12):1703-1707. 1998.