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THE SQUAT HOLDS AN UNPARalleled position of eminence in strength training and conditioning as well as in rehabilitation. No other lifting movement, with the exception of the 2 olympic-style lifts (the snatch and the clean and jerk), places as much stress and strain on the musculoskeletal system as does the squat (31). Between these lifting styles, there is 1 major difference. Squatting permits the lifter to maintain a mechanically strong lifting base throughout the full range of movement, and the knees are not subjected to the danger of stress and strain as they are in snatching and cleaning. This article will perform a brief biomechanical analysis of the squat, including description of the muscle activity involved in its execution. It will also describe the importance and controversy of the squat in sport and in lower-extremity (LE) rehabilitation, particularly in patients who have patellofemoral syndrome (PFS) or anterior cruciate ligament (ACL) deficiencies or who are post-ACL reconstruction status.

Although the LEs are primarily responsible for movement during the parallel squat, the upper extremity (UE) and trunk are involved in stabilization. In descent, the UE and trunk are maintained in the starting position as much as possible. The trunk will have a tendency to flex, and this movement should be controlled so that stress on the lumbar spine is kept to a minimum (21).

In a study by Tibero (48) and O'Shea (31), a detailed biomechanical analysis of the LE during the squat is described. The descending phase demonstrates knee flexion, internal rotation of the tibia and femur, subtalar joint (STJ) pronation, ankle dorsiflexion, talus adduction, and calcaneal eversion. When rising from a squat, knee extension, external rotation of the tibia and femur, STJ supination, ankle plantar flexion, talus abduction, and calcaneal inversion occur. In closed-kinetic chain (CKC) activity, the synchronous actions of the knee and STJ are interdependent motions, and the rotation of the lower leg is an obligatory action that is necessary for normal kinematics of both joints (48). Steindler (44) describes this muscular pattern as the "concurrent shift." Biarticular muscle actions of the LE during the parallel-squat exercise are also quite distinctive; the same muscle undergoes simultaneous eccentric contraction