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Preparatory co-activation of the ankle muscles may prevent ankle inversion injuries

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ABSTRACT

Ankle inversion sprains are the most frequent acute musculoskeletal injuries occurring in physical activity. Interventions that retrain muscle coordination have helped rehabilitate injured ankles, but it is unclear which muscle coordination strategies, if any, can prevent ankle sprains. The purpose of this study was to determine whether coordinated activity of the ankle muscles could prevent excessive ankle inversion during a simulated landing on a 30-degree incline. We used a set of musculoskeletal simulations to evaluate the efficacy of two strategies for coordinating the ankle evertor and invertor muscles during simulated landing scenarios: planned co-activation and stretch reflex activation with physiologic latency (60-millisecond delay). A full-body musculoskeletal model of landing was used to generate simulations of a subject dropping onto an inclined surface with each coordination condition. Within each condition, the intensity of evertor and invertor co-activity or stretch reflexes were varied systematically. The

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