

Long-term Morphological and Functional Changes Following an Acute Hamstring Injury

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ABSTRACT

Approximately 30% of all athletes that experience a hamstring strain injury will re-injure within the first year after returning to sport, with subsequent injuries often more severe and requiring more time away from sport than the initial injury. The objective of this study was to characterize the long-term changes in hamstring morphology and biomechanical function following an acute hamstring strain injury, as these factors likely contribute to the high risk of re-injury.

Sprinting mechanics, passive hamstring stiffness, and isokinetic knee flexion/extension strength were measured from 11 athletes that experienced a hamstring strain injury between 5-13 months prior. Bilateral magnetic resonance (MR) images were obtained to evaluate the presence of residual scar tissue and muscle volume changes. Comparisons were made between the previously injured and non-injured limbs.

Seven subjects injured the long head of the biceps femoris (BFLH) muscle and four subjects injured the more distal short head of the biceps femoris (BFSH). MR images revealed enlarged regions of low intensity signal along the musculotendon junction adjacent to the site of prior injury for 9 of 11 subjects, suggesting the presence of residual scar tissue. Atrophy of the previously injured BFLH and/or hypertrophy of the BFSH were present in 8 of 11 subjects. Asymmetries in hamstring strength, passive hamstring musculotendon stiffness, and peak hamstring lengths during sprinting were present in some subjects, though these results were less consistent.

The long-term presence of scar tissue along the musculotendon junction combined with the changes in volume of previously injured muscle likely compromise local tissue mechanics during sporting activities. Variations in the other measures may result from differences in rehabilitation following the initial injury. Further study is needed to determine the extent to which initial injury and rehabilitation program influences hamstring musculotendon remodeling and function, and how these factors affect re-injury risk.