

<http://www.ncbi.nlm.nih.gov/pubmed/16331873>

[J Strength Cond Res.](#) 2005 Nov;19(4):918-24.

## **Eccentric strain at long muscle length evokes the repeated bout effect.**

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### **Abstract**

The repeated bout effect (RBE) is a phenomenon characterized by less delayed onset muscle soreness (DOMS) and torque deficit after the second of 2 separate eccentric exercise bouts. Previous investigators have reported that shifting of optimum angle after an initial bout of eccentric exercise mediates the RBE. We hypothesized that an RBE for elbow extensor exercise occurs after an initial bout performed at long (starting position of 50 degrees to an end position of 130 degrees) but not short (starting position of 0 degrees to an end position of 80 degrees) muscle length because strain at long length evokes a shifting of the optimum angle to a longer length. Untrained women performed an initial bout at either long or short length (n = 9 per group) followed 1 week later by a repeated bout (RB) through the full ROM (0-130 degrees). Extensor torque and optimum angle was evaluated before, immediately after, and 2 days after each bout. A mechanical transducer depressed on the triceps brachii quantified DOMS. Torque deficits were 3% and 7% after exercise at short vs. long length, respectively. Two days after the RB, torque deficit was 8% and 1% for those previously exercising at short vs. long length (group x bout,  $p < 0.05$ ). Greater DOMS (N) was observed after exercise at long (16 +/- 3) vs. short (23 +/- 2) length; whereas greater DOMS occurred for the short-length (17 +/- 2) vs. long (26 +/- 3) group after the RB (group x bout,  $p < 0.05$ ). Optimum angle shifted to a longer length after exercise at long (+10 +/- 4 degrees) vs. short (+1 +/- 3 degrees) length (group x bout,  $p < 0.05$ ). After the RB, those exercising previously at short length experienced a shift of +15 +/- 4 degrees (main effect,  $p < 0.05$ ). The findings of this study indicate that the repetitive strain at long but not short muscle length evokes both immediate and sustained shifts in optimum angle to longer lengths, and that this shifting mediates ( $r(2) = 0.71$ ) the RBE.

PMID: 16331873 [PubMed - indexed for MEDLINE]