The effect of icing treatment on recovery process of damaged muscle in the rat

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ABSTRACT
Although icing treatment has been well accepted as aftercare in sports fields, the detailed mechanisms of the treatment is not fully understood. In this study, we investigated the effect of icing treatment on the recovery process of rat plantaris muscles with artificially induced muscle damage. Sixty male Wistar rats (8-weeks-old) were randomly assigned to three groups; control (CTL), bupivacaine-injected (BPVC), and icing treatment after BPVC (ICE). Icing treatment was applied for 20 min immediately after BPVC, and the treatment was used once per day for 3 days. The plantaris muscles were removed at 3, 7, 15, and 28 days after the muscle damage, then immunohistochemical and real time RT-PCR analysis were performed. In histochemical analysis, although significant changes were found in the relative muscle weight, cross-sectional area of muscle fiber, percentage of muscle fiber with central nuclei, and expressed immature myosin heavy chain isoforms after muscle damage, as compared to the CTL group, no differences were found between BPVC and ICE groups. In mRNA expression analysis, the ICE group had a significantly lower value of MyoD than the BPVC group at 3 days after the damage. Expression of IL-6 mRNA, which relates to muscle inflammation, indicated significantly higher value in BPVC, but not in ICE, than CTL groups at 7days after the damage. Furthermore, BKB2 receptor, which relates to acute muscle soreness, indicated a significantly higher expression in BPVC than ICE groups at 3 days after the damage. These results suggest that icing treatment is effective to suppress muscle inflammation and soreness at an early stage of recovery from damage, but not effective for muscle regeneration at a later stage.