
Abstract

Purpose
Exercise is associated with a decrease in bone mineral density under certain conditions. One potential mechanism is increased bone resorption due to an exercise-induced increase in parathyroid hormone (PTH), possibly triggered by dermal calcium loss. The purpose of this investigation was to determine whether calcium supplementation either before or during exercise attenuates exercise-induced increases in PTH and C-terminal telopeptide of type I collagen (CTX; a marker of bone resorption).

Methods
Male endurance athletes (n=20) completed three 35-km cycling time trials under differing calcium supplementation conditions: 1) 1000 mg calcium 20 minutes before exercise and placebo during, 2) placebo before and 250 mg calcium every 15 minutes during exercise (1000 mg total), or 3) placebo before and during exercise. Calcium was delivered in a 1000 mg/L solution. Supplementation was double-blinded and trials were performed in random order. PTH, CTX, bone-specific alkaline phosphatase (BAP; a marker of bone formation), and ionized calcium (iCa) were measured before and immediately after exercise.

Results
CTX increased and iCa decreased similarly in response to exercise under all test conditions. When compared to placebo, calcium supplementation before exercise attenuated the increase in PTH (55.8 ± 15.0 vs. 74.0 ± 14.2; mean ± SE; p=0.04); there was a similar trend (58.0 ± 17.4; p=0.07) for calcium supplementation during exercise. There were no effects of calcium on changes in CTX, BAP, and iCa.

Conclusions
Calcium supplementation before exercise attenuated the disruption of PTH. Further research is needed to determine the effects of repeated increases in PTH and CTX on bone (i.e., exercise training), and whether calcium supplementation can diminish any exercise-induced demineralization.