The acute effect of milk supplementation with and without creatine on post-exercise bone metabolism in young healthy females – a crossover study.

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\textbf{Introduction}
Nutrition and exercise positively affect bone health. Specifically, high impact plyometric and resistance exercise provide a sufficient mechanical loading stimulus to support bone development and remodeling, while dairy foods, with their bone-supporting nutrient profile, contribute to the mass, structural integrity and strength of bone. In addition, creatine, a non-nutritive ergogenic aid, has demonstrated a potential positive effect on mitigating bone loss in older adults and a promising mechanistic benefit to bone in cell culture and animal models. However, no study has assessed these factors together following a single high-impact exercise bout. Therefore, the objective of this study is to determine whether milk in combination with creatine will positively impact loading exercise-induced bone cell activity in healthy young females more than milk alone.

\textbf{Methods}
15 healthy young females will be asked to complete 3 acute trials in a randomized, crossover design: 1) exercise+carbohydrate (CHO), 2) exercise+milk (MILK), and 3) exercise+milk+creatine (CRE). Each trial will be separated by a 4-wk wash-out to control for the menstrual cycle and to remove any residual effects from creatine supplementation. Blood samples will be taken at baseline (rested/fasted), 5min, 1h, 24h and 48h post-exercise. Serum bone formation (BSAP) and resorption (CTX and Sclerostin) markers will be measured. Participants will consume their respective supplements (555 ml milk +/- creatine or energy-matched carbohydrate) immediately and 1 hour post-exercise. Participants on the creatine trial will also undergo a creatine-loading phase (5g x 4x/d for 6d) prior to the trial and will consume a 5g/d maintenance dose in the evenings before the 24h and 48h blood samples.

\textbf{Anticipated Results}
Due to the benefits of milk, creatine and loading exercise on bone health, we expect that CRE will have the greatest positive effect on acute bone cell activity after a single high-impact exercise bout, followed by MILK and then CHO.