

## ORIGINAL PAPER

**Effects of resistance training on biomarkers of bone formation and association with red blood cell variables**

Min Hu, Taija Finni, Leiting Xu, Liangchou Zou and Sulin Cheng

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We previously showed that resistance training significantly increased the red blood cell count (RBC) and hematocrit (Hct) and decreased the mean cell hemoglobin concentration (MCHC) in physically inactive men. Since the enhanced hematopoiesis may result, at least partly, from bone metabolism, the purpose of this study was to further investigate the effect of resistance training on serum bone-specific alkaline phosphatase activity (B-ALP), a biomarker of bone formation, and focus on the relationship between the change in B-ALP from baseline to 20-week follow-up and the corresponding changes in RBC, Hct and MCHC. Seventy-four men aged 20–45 years were randomly assigned to training and control groups. The training group underwent a 20-week progressive resistance training. Fasting blood samples were analyzed for serum B-ALP at baseline, and at 10-week and 20-week follow-up. B-ALP in the control group exhibited no significant change. In contrast, the training group increased its B-ALP from baseline at 10-week and 20-week follow-up (both  $P < 0.01$  compared to control group). Within the training group, B-ALP was elevated at 10-week and 20-week follow-up when compared to baseline (both  $P < 0.001$ ). A significant correlation was found between change in B-ALP from baseline to 20-week follow-up and the corresponding changes in RBC, Hct and MCHC in the training group ( $r = 0.49$ ,  $P < 0.01$ ;  $r = 0.56$ ,  $P < 0.01$ , and  $r = -0.38$ ,  $P < 0.05$ , respectively). We concluded that resistance training increased biomarkers of bone formation, which had association with RBC turnover. Adaptive changes of bone metabolism induced by resistance training might facilitate erythropoiesis.

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**Keywords** Resistance training - Bone-specific alkaline phosphatase - Red blood cell - Hematocrit - Mean cell hemoglobin concentration

*Fulltext Preview*

## Effects of resistance training on biomarkers of bone formation and association with red blood cell variables

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**Keywords** Resistance training · Bone-specific alkaline phosphatase · Red blood cell · Hematocrit · Mean cell hemoglobin concentration

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### Introduction

Ossification and hematopoiesis are two important processes taking place inside bone. Although the mechanisms of bone and blood formation have traditionally been viewed as distinct and unrelated, compelling evidence suggests that bone and blood are two tissues whose fates are intertwined [23]. Adult blood cells develop in the bone marrow, whose cavity serves as the main site of human hematopoiesis. There exist specific microenvironments or niches, in which hema-

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