Effect of selenium supplementation on biomarkers of bone turnover

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Selenium is an essential trace element with roles in musculoskeletal health(1,2). Osteoclast inactivation is associated with selenium supplementation in vitro and selenium status is correlated negatively with markers of bone health(3,4). However, the impact of selenium supplementation on bone turnover markers (BTM) has not been studied. This study investigated the effects of selenium supplementation for up to 5 years in older people on BTM including osteocalcin, procollagen type 1 N-terminal propeptide (P1NP), carboxy-terminal collagen crosslinks and bone alkaline phosphatase.

490 Danish men and women (60–74 y) were randomised to receive 0, 100, 200 or 300 μg of selenium daily as selenium-enriched yeast. Plasma selenium concentration was measured using inductively-coupled-plasma mass spectrometry and BTMs were measured using an autoanalyser at baseline, 6 months and 5 years in non-fasted samples. Data were analysed by ANCOVA with polynomial contrasts to investigate the shape of the dose-response relationships. Covariates included: age, body mass index, baseline plasma selenium concentration, baseline BTM, smoking, alcohol, supplement use and medication.

Plasma selenium concentration increased significantly with increasing selenium supplementation at 6 months (84.1, 155.2, 212.3, 258.3 ng/ml for placebo, 100, 200 and 300 μg selenium, respectively) (P < 0.001) and remained elevated at 5 years (88.2, 156.4, 223.8 and 270.9 respectively) (P < 0.001). At 6 months, there was a significant linear decrease in P1NP (P = 0.036, η² = 0.019) with increasing selenium supplementation but this effect was not apparent at 5 years. There was no significant effect of selenium supplementation on any other BTM.

Selenium supplementation reduced P1NP at 6 months but there were no significant effects on other BTM or after 5 years. Since P1NP is a marker of osteoblast function, the fall in P1NP with increasing selenium supplementation suggests a reduction in new bone formation 5. The impact of this change in bone turnover on bone health remains to be determined.

References