Proceedings of the Nutrition Society (2021), **80 (OCE3)**, E110 doi:10.1017/S0029665121002330

Irish Section Conference, 22–24 June 2021, Nutrition, health and ageing — translating science into practice – Part A

Effect of selenium supplementation on biomarkers of bone turnover

G. Perri[1], T. Hill[1], J.C. Mathers[1], J. Walsh[2], F. Gossiel[2], K. Winther[3,4,5], J. Frölich[3], L. Folkestad[3,6], S. Cold[7] and R. Eastell[2]

[1]*Human Nutrition Research Centre, Centre for Healthier Lives, Population Health Sciences Institute, Newcastle University, Newcastle upon Tyne, UK,*
[2]*Sheffield University, Department of Oncology and Metabolism, Metabolic Bone Centre, Sorby Wing, Northern General Hospital, Sheffield, UK,*
[3]*Department of Endocrinology, Odense University Hospital, Odense, Denmark,*
[4]*Centre for Diabetes, Academic Specialist Centre, Stockholm, Sweden,*
[5]*Department of Molecular Medicine and Surgery, Karolinska Institute, Solna, Sweden,*
[6]*Department of Clinical Research, University of Southern Denmark, Odense, Denmark and*
[7]*Department of Oncology, Odense University Hospital, Odense, Denmark*

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 ($P = 0.036$, $\eta 2 = 0.019$) 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 PINP 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

1. Moreno-Reyes R, *et al.* (2001) *J Bone Miner Res* **16**, 1556–63.
2. Zhang Z, *et al.* (2014) *Biophys Acta* **1840**, 3246–3256.
3. Hoeg A, *et al.* (2012) *J Clin Endocrinol Metab* **97**, 4061–70.
4. Beukhof CM *et al.* (2016) *PLoS ONE* **11**, e0152748.
5. Kuo T & Chen CH (2017) *Biomark Res* **5**, 18