

Temporal Change in Biomarkers of Bone Turnover Following Late Evening Ingestion of a Calcium-Fortified, Milk-Based Protein Matrix in Postmenopausal Women with Osteopenia

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The diurnal rhythm of bone remodeling suggests nocturnal dietary intervention to be most effective. This study investigated the effect of bedtime ingestion of a calcium-fortified, milk-derived protein matrix (MBPM) or maltodextrin (CON) on acute (0–4 h) blood and 24-h urinary change in biomarkers of bone remodeling in postmenopausal women with osteopenia. In CON, participants received 804 ± 52 mg calcium, 8.2 ± 3.2 μ g vitamin D and 1.3 ± 0.2 g/kg BM protein per day. MBPM increased calcium intake to 1679 ± 196 mg, vitamin D to 9.2 ± 3.1 μ g and protein to 1.6 ± 0.2 g/kg BM. Serum C-terminal cross-linked telopeptide of type I collagen (CTX) and procollagen type 1 amino-terminal propeptide (P1NP), and urinary N-telopeptide cross-links of type I collagen (NTX), pyridinoline (PYD) and deoxypyridinoline (DPD) was measured. Analyzed by AUC and compared to CON, a 32% lower CTX ($p = 0.011$, $d = 0.83$) and 24% ($p = 0.52$, $d = 0.2$) increase in P1NP was observed for MBPM. Mean total 24 h NTX excreted in MBPM was 10% ($p = 0.035$) lower than CON. Urinary PYD and DPD were unaffected by treatment. This study demonstrates the acute effects of bedtime ingestion of a calcium-fortified, milk-based protein matrix on bone remodeling.

Keywords: randomized control trial; milk protein matrix; nutrient intervention; nutrient timing; bone remodeling; bone turnover markers; bone health; osteopenia; postmenopausal women