

Bone

Dietary Lycopene and Disease Risk

Disease type	First Author	Study Title and Complete Citation	Date	Abstract	Study Type	G.Tom +, N, -	P.Tom +, N, -	F.Tom +, N, -	Lyco +, N, -	Other +, N, -
Bone	Wattanapenpaiboon N	Dietary carotenoid intake as a predictor of bone mineral density Wattanapenpaiboon N, Lukito W, Wahlqvist ML, Strauss BJ. Asia Pac J Clin Nutr. 2003;12(4):467-73.	2003	Our understanding of the influence of nutrition on bone health is limited because most studies concentrate on the role of calcium and protein, while other nutrients receive less attention. Recent evidence shows a positive link between fruit and vegetable consumption and bone health. In the present study, the relationships of dietary intakes of preformed retinol and carotenoids, one group of phytonutrients abundant in fruit and vegetables, were examined in an Anglo-Celtic Australian population of 68 men and 137 women. Bone mass of total body and lumbar spine were positively related to lycopene intake in men, and to lycopene and lutein/zeaxanthin intake in premenopausal women. In addition, a positive association of lumbar spine bone mass with dietary beta-carotene intake was observed in postmenopausal women. No relationship was found between dietary retinol intake and bone mineral status. The finding of the present study suggests a beneficial effect of fruit and vegetable consumption, as indicated by dietary carotenoid intake, on bone health, possibly via an antioxidant mechanism.	CS				(-) ↓ risk ~~~~~ ↑ [lyco] intake corr to ↑ bone mass at total body and lumbar spine	
Bone	Sahni S	Protective effect of total carotenoid and lycopene intake on the risk of hip fracture: a 17-year follow-up from the Framingham Osteoporosis Study. Sahni S, Hannan MT, Blumberg J, Cupples LA, Kiel DP, Tucker KL.	2009	In vitro and in vivo studies suggest that carotenoids may inhibit bone resorption, yet no previous study has examined individual carotenoid intake (other than beta-carotene) and the risk of fracture. We evaluated associations of total and individual carotenoid intake (alpha-carotene, beta-carotene, beta-cryptoxanthin, lycopene, lutein + zeaxanthin) with incident hip fracture and nonvertebral osteoporotic fracture. Three hundred seventy men and 576 women (mean age, 75 +/- 5 yr) from the Framingham Osteoporosis Study completed a food frequency questionnaire (FFQ)	PC Framingham Osteo Study				(-) ↓ fracture risk with lyco intake	

		J Bone Miner Res. 2009 Jun;24(6):1086-94.		in 1988-1989 and were followed for hip fracture until 2005 and nonvertebral fracture until 2003. Tertiles of carotenoid intake were created from estimates obtained using the Willett FFQ adjusting for total energy (residual method). HRs were estimated using Cox-proportional hazards regression, adjusting for sex, age, body mass index, height, total energy, calcium and vitamin D intake, physical activity, alcohol, smoking, multivitamin use, and current estrogen use. A total of 100 hip fractures occurred over 17 yr of follow-up. Subjects in the highest tertile of total carotenoid intake had lower risk of hip fracture (p = 0.02). Subjects with higher lycopene intake had lower risk of hip fracture (p =0.01) and nonvertebral fracture (p = 0.02). A weak protective trend was observed for total beta-carotene for hip fracture alone, but associations did not reach statistical significance (p = 0.10). No significant associations were observed with alpha-carotene, beta-cryptoxanthin, or lutein + zeaxanthin. These results suggest a protective role of several carotenoids for bone health in older adults.						
Bone	Sahni S	Inverse association of carotenoid intakes with 4-y change in bone mineral density in elderly men and women: the Framingham Osteoporosis Study. Sahni S, Hannan MT, Blumberg J, Cupples LA, Kiel DP, Tucker KL. Am J Clin Nutr. 2009 Jan;89(1):416-24. Epub 2008 Dec 3.	2009	BACKGROUND: In vitro and in vivo studies suggest that carotenoids may inhibit bone resorption and stimulate proliferation and differentiation of osteoblasts. Few studies have examined the association between carotenoid intake (other than beta-carotene) and bone mineral density (BMD). OBJECTIVE: We evaluated associations between total and individual carotenoid intake (alpha-carotene, beta-carotene, beta-cryptoxanthin, lycopene, and lutein+zeaxanthin) with BMD at the hip, spine, and radial shaft and the 4-y change in BMD. DESIGN: Both cross-sectional and longitudinal analyses were conducted in 334 men and 540 women (mean +/- SD age: 75 +/- 5 y) in the Framingham Osteoporosis Study. Energy-adjusted carotenoid intakes were estimated from the Willett food-frequency questionnaire. Mean BMD	PC Framingham Osteo Study and CS				(-) men= ↓BMD loss at trochanter women= ↓BMD loss at lumbar spine ~~~~~ N CS portion of study	

and mean 4-y BMD changes were estimated, for men and women separately, by quartile of carotenoid intake with adjustment for age, BMI, height, physical activity index, smoking (never compared with ever smokers), multivitamin use, season of BMD measurement (for cross-sectional analyses on BMD only), estrogen use (in women), and intakes of total energy, calcium, vitamin D, caffeine, and alcohol.

RESULTS: Few cross-sectional associations were observed with carotenoid intake. Associations between lycopene intake and 4-y change in lumbar spine BMD were significant for women (P for trend = 0.03), as were intakes of total carotenoids, beta-carotene, lycopene and lutein+zeaxanthin with 4-y change in trochanter BMD in men (P for trend = 0.0005, 0.02, 0.009, and 0.008, respectively).

CONCLUSIONS: Carotenoids showed protective associations against 4-y loss in trochanter BMD in men and in lumbar spine in women. No significant associations were observed at other bone sites. Although not consistent across all BMD sites examined, these results support a protective role of carotenoids for BMD in older men and women.