Am J Physiol Renal Physiol. 2003 Jan;284(1):F32-40.

Neutralization of Western diet inhibits bone resorption independently of K intake and reduces cortisol secretion in humans.

Maurer M, Riesen W, Muser J, Hulter HN, Krapf R.

A Western-type diet is associated with osteoporosis and calcium nephrolithiasis. On the basis of observations that calcium retention and inhibition of bone resorption result from alkali administration, it is assumed that the acid load inherent in this diet is responsible for increased bone resorption and calcium loss from bone. However, it is not known whether the dietary acid load acts directly or indirectly (i.e., via endocrine changes) on bone metabolism. It is also unclear whether alkali administration affects bone resorption/calcium balance directly or whether alkali-induced calcium retention is dependent on the cation (i.e., potassium) supplied with administered base. The effects of neutralization of dietary acid load (equimolar amounts of NaHCO(3) and KHCO(3) substituted for NaCl and KCl) in nine healthy subjects (6 men, 3 women) under metabolic balance conditions on calcium balance, bone markers, and endocrine systems relevant to bone [glucocorticoid secretion, IGF-1, parathyroid hormone (PTH)/1,25(OH)(2) vitamin D and thyroid hormones] were studied. Neutralization for 7 days induced a significant cumulative calcium retention (10.7 +/- 0.4 mmol) and significantly reduced the urinary excretion of deoxypyridinoline, pyridinoline, and n-telopeptide. Mean daily plasma cortisol decreased from 264 +/- 45 to 232 +/- 43 nmol/l (P = 0.032), and urinary excretion of tetrahydrocortisol (THF) decreased from 2,410 +/- 210 to 2,098 +/- 190 microg/24 h (P = 0.027). No significant effect was found on free IGF-1, PTH/1,25(OH)(2) vitamin D, or thyroid hormones. An acidogenic Western diet results in mild metabolic acidosis in association with a state of cortisol excess, altered divalent ion metabolism, and increased bone resorptive indices. Acidosis-induced increases in cortisol secretion and plasma concentration may play a role in mild acidosis-induced alterations in bone metabolism and possibly in osteoporosis associated with an acidogenic Western diet.