

## **The effect of bicarbonate in mineral water on bone metabolism: interventional studies.**

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Oral K-Bicarbonate improved Calcium balance in postmenopausal women (Sebastian 1994). We could show an effect of Bicarbonate (Bic) in food and in mineral water, but not of an acid load, on bone metabolism in 4 controlled intervention trials.

A) Basic food and Bic-rich mineral water were given to 8 male volunteers during 4 days, and then replaced by a control diet, equal in calories, protein, Na, and Calcium (Ca), in a randomized order after a washout period. The first diet decreased sign. urinary Ca excretion by 45%, and resorption markers (CTX/creat.) by 15% (Buclin 2001). Therefore, short term nutritional alkali-load reduced bone resorption.

B) An oral acid load of 6.4 g (120 mmol) NH<sub>4</sub>Cl per day for 2 days given to 8 volunteers, and compared to 120 nmol NaCl/day, lowered urin. pH by about 1 unit over the whole day compared to NaCl ( $p=0.0001$ ), and slightly decreased blood pH and bicarbonate by about 2 mmol/l ( $p=0.002$ , resp.  $0.0001$ ). But after 1 day it had no influence on markers of bone metabolism or on their response to Ca (Buclin 2003).

C) Bic-rich mineral water in 20 healthy (Bic 2643 mg and Ca 378 mg /1.5 l) was given over 4 weeks to 10 young women on a free diet and compared with a Ca-rich water (Bic 605 mg, Ca 728 mg in 1.5l)(N=10). The Bic-rich water increased slightly urine pH (fasting and 24 hrs), and lowered sign.the resorption markers (urin. CTX/creat. in 24 hr urine) by 25% (ANOVA  $p<0.05$ ). The Ca-rich water increased only urinary Ca excretion by 31% (Burckhardt).

D) The effect in Calcium sufficiency: 30 young women on an equilibrated free diet were given 1.5 l per day of either a Ca-rich water (Bic 437 mg, Ca 780 mg /1.5 l) or of a water rich in both Ca and Bic (Bic 3258mg, Ca 821mg/1.5 l). While the Ca-water only had random effects on bone resorption, the Bic-Ca-water sign. decreased PTH by 16% and CTX by 15% (Wynn 2006, in prep).

Conclusion: Mineral water rich in Bicarbonate, but not mineral water rich in Calcium, decreases bone resorption in normal subjects, even on a free diet and a high calcium intake (> 1500 mg/d).

### References

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