Letter to the Editor

Low versus High Meat Diets: Effects on Calcium Metabolism

Dear Editor,

I compliment Dr. Roughead and colleagues for an elegant study rigorously comparing the long-term effects of a high meat versus a low meat diet on important measures of body calcium and bone metabolism (1). Their highly credible data warrants the detailed analysis presented in the paper.

However, the wording of the paper’s conclusion as stated in the last paragraph caught my attention: “... this study indicates that adding meat to the diet does not adversely affect calcium retention and bone metabolism in postmenopausal women.” I fear that conclusion might mislead many postmenopausal women into thinking they may arbitrarily increase their meat intake without adversely affecting their calcium retention and bone metabolism. I must agree that one can take the investigators’ conclusion as certainly true, but only in the case in which meat is added to the diet in the particular way the investigators did it, namely keeping energy intake relatively unchanged by reducing specifically the intake of numerous cereal grain products (pasta, rice, pretzels, bagels, croissants, and chow mein noodles) amounting to 148 g, and to a lesser extent, potatoes and margarine amounting to 30 g. I suggest that the authors’ conclusion as worded might not hold true if meat intake were increased at the isoenergetic expense of other foods, for example predominantly non-grain plant foods such as tomatoes, cucumbers, carrots, celery, oranges and the like, or predominantly energy-dense nutrient-poor foods, such as separated fats and oil and refined sugars.

I dwell on the authors' wording and specific diet comparison in part because it would generally have been thought that substituting meat for mostly plant-based foods, and a smidgen of separated fat, would result in much larger increases in net endogenous acid production (NEAP) than the investigators found as indicated by their measures of renal net acid excretion (RNAE). At wk 8, which presumably approached a steady-state, the average increase in RNAE was only 12 mEq/d, or 29% greater than the baseline 48.1 mEq/d. That matches very well the 18% increase in RNAE that Dr. Roughead et al. found when they replaced meat mostly with cereal grains (wk 8). Thus, substituting mostly meat for cereal grains just does not increase NEAP very much, and therefore presumably would not much affect systems adversely affected by increasing NEAP, given the already substantial baseline NEAP.

We also computed that if one replaces all of the cereal grain energy in the diet with fruits and vegetables, the diet’s total NEAP becomes negative (−29 mEq/d), i.e., it becomes net base-producing, a >77 mEq/d reduction in NEAP from the prereplacement positive value of +48 mEq/d. On that baseline, adding meat in the amount Dr. Roughead and colleagues added to their low meat diet, isoenergetically replacing fruits and vegetables, increases NEAP by over 90%, an amount that might very well result in detectable effects on calcium and bone metabolism.

For these reasons, I suspect that had the baseline low meat diet employed by Dr. Roughead et al. not contained so much cereal grain energy, but instead contained that energy as fruits and nongrain vegetables (e.g., of low phytate content), their meat substitution experiment would have substantially increased RNAE, both because of the gain of acid from the meat and loss of base from the replaced fruits and nongrain vegetables. Then, I suspect, they would have found a substantial increase in steady-state urine calcium excretion, and who knows what change in whole body calcium retention and bone metabolism. I suggest one cannot evaluate generically high meat versus low meat diets on this issue of calcium and bone metabolism. One has to evaluate many different specific high meat and low meat diet pairs before one can decide whether “adding meat to the diet” typically does not adversely affect calcium retention and bone metabolism in postmenopausal women.

It might be the case that even though the high meat diet was not adverse by comparison to the low meat diet, both diets were equally adverse. Dr. Roughead et al. did not compare a high meat net acid-producing diet with a low meat low net acid-producing diet, or a low meat net base-producing diet.
From this perspective, the paper’s conclusion might have been more awkwardly but more precisely and informatively worded as ”...this study indicates that adding meat to the diet and isoenergetically subtracting foods comprising predominately cereal grain products does not adversely affect calcium retention and bone metabolism in postmenopausal women.”

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