



# The Osteoporosis Education Project

Susan E. Brown, Ph.D.

Director

*working with nature to regenerate bone health*

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Collaborative research with Dr. Susan Whiting of the University of Saskatchewan on the relationship between first morning urine pH measurement and net acid load. For an abstract of these research findings as presented at the 2002 ASBMR meetings, see the First Morning pH abstract below. Investigators Susan Whiting, Ph.D., Janet Bell, and Susan E. Brown, Ph.D., CCN.

## *First Morning Urine Measured With pH Paper Strips Reflects Acid Excretion*

*Susan J. Whiting, Janet Bell, College of Pharmacy and Nutrition, University of Saskatchewan, 110 Science Place, Saskatoon, SK, S7N 5C9 and Susan E. Brown, Osteoporosis Education Project, 605 Franklin Park Drive, East Syracuse, NY 13057*

*Net acid excretion (NAE) is implicated in bone loss, as increased calcium loss is seen with a high net acid excretion. Dietary protein is identified as a significant producer of acid whereas fruit and vegetable may counteract this effect through the production of metabolizable organic anions which buffer acid. Determination of NAE is important in recognizing the effect diet may have on bone. Most commonly, a 24-hour urine collection is obtained for measurement of NAE where NAE is measured as titratable acidity minus bicarbonate (TA-bicarb) plus ammonium (NH<sub>4</sub><sup>+</sup>). However, this measurement can be inconvenient and pH measured on first morning urine with semi-quantitative paper strips may be a practical estimator of NAE. We recruited 23 (4M, 19F) healthy subjects age 20-50 y who recorded dietary intake for a day during which they collected urine from approximately 7 am to 11 pm in one container ("day") and approximately 11 pm to 7 am ("overnight", ON) in a separate container. The first morning void contained ON urine. Subjects also provided a two-hour fasting urine at 9 am. pH paper strips (colorpHast®, EM-Reagents, range 4-7) were used to measure pH of the ON urine, as would be done in practice. A second set of strips (pH range 6.5-10) was used if initial pH read high. Although measurement with pH paper strips was not significantly correlated with 24-hr NAE, there was a significant correlation with 24-hour TA-bicarb ( $r = -0.466$ ,  $p < 0.025$ ). Further, pH strip measures were significantly correlated with ON NAE ( $r = -0.710$ ,  $p < 0.005$ ). We noted that ON NAE was correlated with total NAE ( $r = 0.504$ ,  $p < 0.014$ ). We conclude there is useful information is measuring first morning urine pH (which provides pH of urine formed overnight) to obtain an estimate of acid excretion. pH paper strips appear to be useful in the absence of longer (more invasive) urine collections.*

**605 Franklin Park Drive - East Syracuse, NY 13057**

tel: 315.437.9384

drsbrown@earthlink.net  
www.betterbones.com

fax: 315.432.9231