

Summer Meeting hosted by the Irish Section, 16–19 July 2012, Translational nutrition: integrating research, practice and policy

Homocysteine and related B-vitamin status as determinants of bone mineral density in older Irish adults

M. M. Clarke¹, M. Ward¹, L. Hoey¹, J. J. Strain¹, A. Molloy², J. Scott³ and H. McNulty¹

¹Northern Ireland Centre for Food and Health, University of Ulster, Coleraine, BT52 1SA, ²School of Clinical Medicine, Trinity College Dublin 2, Ireland and ³School of Biochemistry and Immunology, Trinity College Dublin 2, Ireland

Osteoporosis, a skeletal disorder characterised by compromised bone strength, results in an increased fracture risk⁽¹⁾ with considerable costs to both patients and the health service. While vitamin D has a well established role in bone health, evidence is emerging to support a role for the B-vitamins, and the related metabolite homocysteine (Hcy), in bone health^(2,3). The aim of this study was to investigate homocysteine and related B-vitamin status as determinants of bone mineral density (BMD).

Existing data from a subset ($n = 1276$) of participants recruited to the Trinity Ulster Department of Agriculture (TUDA) study, a large observational cohort study of older Irish adults, were examined. Blood samples were analysed for plasma Hcy, red cell folate (RCF), serum folate and vitamin B12 at Trinity College Dublin. BMD at the total hip, femoral neck (FN) and spine were measured using dual energy X-ray absorptiometry (DXA) scans (Lunar Prodigy, GE Healthcare, UK).

Of the general determinants of osteoporosis (defined as a T-Score of -2.5 SD or lower), the following were found to be significant predictors: age ($\beta = 0.077$, $p < 0.001$), female gender ($\beta = 1.153$, $p < 0.001$) and BMI ($\beta = -0.165$, $p < 0.001$) (logistic regression). As expected, a higher incidence of osteoporosis was observed among women (25%) compared with men (9%). BMD values at the total hip and femoral neck were significantly higher in women with the highest red cell folate status compared to those with the lowest red cell folate status (Table).

	Low RCF Tertile 170–667 nmol/l $n = 228$	Mid RCF Tertile 668–995 nmol/l $n = 229$	High RCF Tertile 996–2615 nmol/l $n = 228$	P value
Age (y)	70.0	69.2	69.1	0.274
BMI (kg/m ²)	29.8	30.5	30.1	0.357
Vertebral BMD (g/cm ²)	1.032	1.054	1.071	0.075
Total Hip BMD (g/cm ²)	0.894 ^a	0.913 ^{a,b}	0.928 ^b	0.041
Femoral Neck BMD (g/cm ²)	0.829 ^a	0.851 ^{a,b}	0.861 ^b	0.024

Differences between groups were assessed using ANOVA with Tukey post-hoc test; different superscript letters denote significant differences between any 2 groups ($p < 0.05$)

After adjustment for age, BMI, vitamin D and serum creatinine levels (a marker of renal function), a weak but significant association between Hcy and BMD at the FN ($r = -0.081$, $p = 0.035$) and total hip ($r = -0.100$, $p = 0.009$) was found in women. In conclusion, these preliminary findings add to the current body of evidence suggesting a potential protective role for folate and related B-vitamins in bone health. These relationships will be further explored in this cohort when the full set of data, including relevant genetic information, is available.

We would like to acknowledge the co-funding for this research from the Irish Department of Agriculture and the Northern Ireland Department for Employment and Learning through its “Strengthening the all-Island Research Base” initiative.

1. Yazdanpanah N, Zilickens MC, Rivadeneira F *et al.* (2007) *Bone* **41**, 987–94.
2. Gjesdal C, Vollset S, Ueland P *et al.* (2007) *Journal of Bone and Mineral Research* **22**, 747–756.
3. Gjesdal C, Vollset S, Ueland P *et al.* (2006) *Archives of Internal Medicine* **166**, 88–94.