

# Abstract

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## Older people in China and the United Kingdom differ in the relationships among parathyroid hormone, vitamin D, and bone mineral status.

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**OBJECTIVE:** To explore whether there are ethnic differences in relationships among parathyroid hormone (PTH), vitamin D, and bone mineral status, 352 healthy volunteers, 60-83 years old, were studied in Shenyang, Peoples' Republic of China (108 men, 110 women), and in Cambridge, UK (67 men, 67 women), in late winter.

**METHODS:** Early morning fasting blood and 2-h fasting urine were analyzed for 25-hydroxyvitamin D (25OH-D), PTH, and free deoxypyridinoline (DPD). Hip bone mineral status was measured using dual-energy X-ray absorptiometry (Lunar).

**RESULTS:** There were significant differences ( $P < 0.001$ ) in plasma 25OH-D and PTH concentrations between Shenyang and Cambridge [25OH-D nmol/L: Shenyang = 29.0 (SD 12.7), Cambridge = 35.7 (12.9)]; PTH ng/L: Shenyang = 34.3 (13.4), Cambridge = 25.2 (11.0)]. PTH was negatively related to 25OH-D in both populations. The relationship was exponential, best described by an inverse log-log equation with no break point ( $P < 0.001$ ), indicating that the exponential curve did not tend toward a low plateau. PTH was higher for a given 25OH-D and decreased less with increasing 25OH-D in Shenyang than in Cambridge (country- $\ln$ 25OH-D interaction,  $P = 0.0005$ ). After adjusting for bone area, weight, height, age, and sex, hip bone mineral content (BMC) was significantly related to PTH concentration in Cambridge but not in Shenyang [femoral neck coefficient: Cambridge = -0.064 (SE 0.027),  $P = 0.02$ ; Shenyang = -0.027 (0.028),  $P = 0.3$ ; trochanter: Cambridge = -0.116 (0.034),  $P = 0.001$ ; Shenyang = -0.019 (0.027),  $P = 0.5$ ]. There was a significant country- $\ln$ PTH interaction at the trochanter ( $P = 0.02$ ), but not at the femoral neck ( $P = 0.7$ ). A weak positive association between BMC at the femoral neck and 25OH-D concentration was found in Cambridge [coefficient: 0.054 (0.028),  $P = 0.05$ ] but not in Shenyang (coefficient: -0.013,  $P = 0.5$ ; country- $\ln$ 25OH-D interaction,  $P = 0.07$ ). Urinary DPD concentration was also positively related to plasma PTH concentration in Cambridge subjects only [coefficient: 0.2 (0.08),  $P = 0.02$ ].

**CONCLUSION:** These data suggest that although PTH increases when 25OH-D decreases, and Chinese people have a higher PTH for a given 25OH-D, older Chinese adults may be more resistant than Britons to the effects of PTH on bone.

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