

ABSTRACTS FROM THE BONE AND TOOTH SOCIETY MEETING, LONDON, SEPTEMBER 24-25, 1987

1. Acute and long term metabolic and parathyroid effects of fluoride in osteoporosis

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45 osteoporotic patients previously receiving mineral supplements were studied during subsequent additional treatment with sodium fluoride 60 mg daily for up to 5 years.

First effects of fluoride therapy were a significant decline in serum calcium and phosphorus and rise in biologically active parathyroid hormone (bio-PTH). Calcium balance showed zero overall change but fell significantly in those who showed least serum changes, in whom both calcium and phosphorus absorption diminished. Urine phosphorus excretion, however, fell equally throughout.

Subsequent annual balances showed significant calcium retention. Alkaline phosphatase rose significantly and changes in calcium retention and alkaline phosphatase were positively correlated ($r=0.5311$, $p<0.01$). Rising alkaline phosphatase therefore indicates effective osteogenesis rather than an osteomalacic mineralization defect. Individually, parallel changes in calcium balance and alkaline phosphatase indicated that while some patients remained refractory throughout others who responded initially might develop resistance at any later stage. Fluoride balance correlated poorly with calcium balance, with change in calcium balance and with serum fluoride.

After one year, log-converted bio-PTH levels were significantly higher than pre-treatment values but remained in the normal range. Plasma phosphorus, but not calcium, remained significantly depressed for 2 years.

Metabolic effects of fluoride on the skeleton therefore depend primarily on osteoblast responsiveness rather than on fluoride load or fluoride retention *per se*: this responsiveness may depend on permissive effects of other agents such as PTH.

2. Osteoid and fracture of the proximal femur: extended osteoid seams of normal thickness predict reduced forearm cortical bone density

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For 15 months every patient admitted to Northwick Park Hospital with a diagnosis of fractured neck of femur, aged 60 years or more, was asked to participate in a study to elucidate various indices of calcium metabolism and skeletal status which might be useful predictors of a propensity to fracture (Wootton *et al.*, Clin Sci Mol Med 57 93 1979). About half consented. During the operative procedure, a transiliac 8mm biopsy was obtained and embedded undecalcified in methyl methacrylate. Initially, only quantitation of the osteoid bright lines was undertaken and these were only rarely increased. Subsequently, a total of 37 biopsies which were intact or near-intact have been quantitated. Two patients had clinical hyperparathyroidism and were excluded from further analysis.

(Females only)	Osteoid surfaces (%)	Osteoid volume (%)	Resorption surfaces (%)	Thickness index	Trabecular bone volume (%)
Mean	24.9	3.74	4.90	15.6	14.4
SEM	2.4	0.38	0.72	0.7	1.0
n	27	27	27	27	19

These new results were compared with those obtained previously, particularly the bone mineral content of the forearm (two-thirds distal: cortical bone).

Plasma albumin concentration (measured immediately after fracture and before surgery) was a fair predictor of forearm density (Student's $t=2.55$; $p<0.015$; $n=46$ female cases). It was also correlated inversely with trabecular osteoid surfaces ($t=2.38$; $p<0.025$; $n=26$), which in turn correlated inversely with forearm density (Student's $t=3.89$; $p<0.001$). Albumin is thought to relate to nutritional status; it is also a constituent of mineralizing osteoid. The normal results for thickness index confirmed osteomalacia as being rare. Nevertheless, mean osteoid surfaces were increased as