

FLUORIDE IN OSTEOPOROSIS: CLINICAL AND QUANTITATIVE HISTOLOGICAL STUDIES ON BONE STRUCTURE AND BONE REMODELLING

by

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(Abstract)

Sodium fluoride was administered in uncoated tablets in doses of 37 to 100 mg per day for periods ranging from 21 days to over 3 years to 31 patients with osteoporosis, 26 of whom had idiopathic osteoporosis and rheumatoid arthritis accompanied by severe osteoporosis. Bone biopsies were done in all patients. Quantitative histological evaluation was performed in 48 iliac crest biopsies from 16 patients.

Fluoride caused a significant increase in serum alkaline phosphatase after one month of treatment and persisted for the first year. The increase was not observed when the dose of F^- was below 37 mg/day. No significant change in serum calcium or phosphorus occurred. Urinary calcium excretion, determined in 16 patients, decreased significantly. After an intravenous calcium load the calcium retention increased significantly over mean control values during the first nine months of treatment.

Coarse and thickened trabeculae on X-ray were noticed in approximately 70% of treated patients after nine to twelve months. Volumetric density of cancellous bone showed a marked increase, reaching above twice its original value after 80 weeks of treatment. This augmentation was mainly due to apposition of new bone on the surface of pre-existing trabeculae.

The positive skeletal balance is caused by a tremendous stimulation of bone formation. After 40 weeks of treatment the average surface extent of osteoblast layers reached a maximum; it was 17 times higher than the original value. Concomittently a retardation of osteoid mineralization became obvious, showing its maximum after 40 weeks of treatment. In later periods of treatment, an apparent recovery from the mineralization delay was noted which might be partly due to reduction of the daily intake of sodium fluoride, and/or additional application of vitamin D. However, vitamin D, when administered together with F^- from the beginning, could not prevent a temporary surface osteomalacia. Its main effect was a marked synergistic action with that of F^- , e. g. the stimulation of osteoblasts.

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