

## SHORT COMMUNICATION

### BONE QUALITY CHANGES IN 3 CASES OF HYPOPHOSPHATASIA: A FTIRI STUDY

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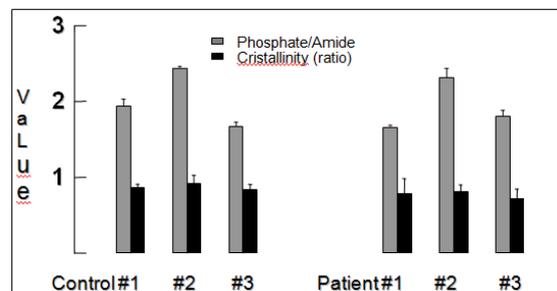
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Hypophosphatasia is an heritable form of osteomalacia, with a variable clinical expression. The biochemical hallmark of the disease is a defect of the TNSALP resulting in defective skeletal mineralization. The aim of the present study was to analyze bone changes in 3 patients with hypophosphatasia by histomorphometry of a transiliac bone biopsy and Fourier transformed infrared imaging (FTIRI). Transiliac bone biopsies were obtained with a 7 mm trephine, after double tetracycline labeling. Specimens were fixed in alcohol and embedded undecalcified in methacrylate. Sections were cut dry on a heavy duty microtome (Leica Polycut S), stained with Goldner's trichrome or left unstained for measurement of tetra-cycline-based parameters.

The following histomorphometric parameters were analyzed: osteoid volume [OV/BV, %], surfaces [OS/BS, %], osteoid thickness [O.Th,  $\mu\text{m}$ ], adjusted apposition rate [Aj.AR,  $\mu\text{m}/\text{d}$ ] Results are given as Zscore by reference to normal values obtained in controls.

Four micron thick sections of undecalcified bone were prepared for FTIRI. Each section was flattened between two windows of KBr optical windows and analyzed on a Bruker Hyperion microscope including a 64 x 64 element focal plane array detector coupled to a Vertex spectro meter and infrared spectra analyzed using Opus software. The position of amides I band (approximately 1590–1720  $\text{cm}^{-1}$ ) and phosphates n1, n 3 band (appro-

ximately 900–1200  $\text{cm}^{-1}$ ) were recorded on the spectrums. The methylmethacrylate was clearly identified by a specific peak at 1750  $\text{cm}^{-1}$  and the amount of polymer did not interfere with measurements. The phosphate-amide ratio was calculated from the intensity ratios of the 900-1200/1590-1720  $\text{cm}^{-1}$  peaks. Crystallinity was determined on the curve-fit peak area ratios of the 1030-1020  $\text{cm}^{-1}$  bands. Data were compared with results obtained on age-matched controls and processed similarly.



Amides were present throughout the width of trabeculae. Phosphates appeared concentrated in the center of trabeculae. FTIRI is a useful method to study mineral and matrix properties of bone in metabolic diseases.

In osteomalacia of hypophosphatasia, we failed to identify an alteration of bone quality in the center of the trabeculae since the phosphate content did not differ from controls.