

SR-XRF INVESTIGATION OF HUMAN BONE

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Mineral and trace elements are not homogeneously distributed in human bone. Differences in concentrations have been documented between the outer (Substantia Compacta: SC) and inner bone region (Substantia Spongiosa: SS). However, little information is available about the distribution and the concentration ratio of mineral and trace elements within this transition area (SC/SS). The microfluorescence facility installed at the bending magnet Beamline L at HASYLAB, Hamburg, was used for the investigation focussing on the concentration of Pb; among the heavy metals, Pb – acquired through food and pollution – has been proven to exert the strongest interaction with Ca, the essential bone mineral. Moreover with increased bone metabolism lead is excreted equimolar with Calcium [1]. In this preliminary study bone of a hip-operated adult patient was cut to show a plane perpendicular to the SC/SS transition surface. For the Pb detection, the excitation with the synchrotron white spectrum to excite the K-shell and a monochromatic beam obtained with the Si(111) channel cut to measure the L-shell fluorescence were compared; the monochromatic excitation delivered the best peak to background ratio and was chosen.

[1] W. Osterode, G. Reining, G. Männer, J. Jäger and H. Vierhapper, Thyroid 10, 161-164 (2000)