

LEVELS AND SPATIAL DISTRIBUTION OF TRACE ELEMENTS IN BONE FOLLOWING STRONTIUM TREATMENT IN CALCIUM DEFICIENT RATS

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Strontium Ranelate (SrR) is a drug proposed for the treatment of osteoporosis. It has been reported to decrease bone resorption and increase bone formation, though good evidence for latter is lacking. (1). Strontium (Sr) is incorporated in bone during the mineralization process. Sr atoms can replace calcium in the hydroxyapatite crystal. Higher concentrations of Sr are observed in newly formed bone than in old bone (2). An experimental osteoporosis model in rats (3) was used in this study to determine if a calcium deficient diet will result in an altered incorporation of Sr into bone compared to a normal diet. Three month old ovariectomized female rats were divided into five groups: an untreated control group and four groups treated with low vs high SrR doses with either a normal or deficient Ca diet. Undecalcified rat vertebral bodies were analyzed by quantitative Backscattered Electron Imaging using a pixel resolution of 4µm. Grey-level images were generated to differentiate between highly mineralized and newly formed bone matrix. Areas of interest were analyzed with Synchrotron Radiation induced confocal micro x-ray fluorescence analysis (SR µ-XRF) to determine the distribution of Sr in trabecular bone. Measurements were performed at the FLUO beamline at ANKA using a beamsize of 10x10µm and a depth resolution of 12µm with excitation energy of 17,7keV.

By the comparison of the qBEI images and the elemental maps we were able to show that a calcium deficient diet leads to a significantly higher incorporation of Sr into newly formed bone matrix.