

EFFECTS OF GAMMA IRRADIATION ON BOVINE BONE MICROHARDNESS AND MOLECULAR STRUCTURE

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The skeletal systems is a complex mixed compounds, organic and inorganic, that should present a mechanical resistance to perform functions as protection of the vital organs and load distribution. Gamma radiation is an ionizing radiation that comes from radioactive sources or X-ray generator and it is commonly used in health establishments such as radio diagnostic exams, radiotherapy and sterilization of allograft. The characterization of the irradiated bone tissue can be an important tool in the study of the components that are affected and how much each dose of ionizing radiation can alter its mechanical properties. This information will be very important in in vitro and ex vivo studies where sterilization of the bone material is necessary and may still be useful in understanding the effects on the bone tissue of patients undergoing short-term radiotherapy. For this, 110 samples of bovine femur diaphysis were randomized into 11 groups: G1- untreated (control); G2 to G11 were submitted to gamma irradiation (60Co Gammacel). Samples were polished before irradiation and submitted to a Knoop Microhardness Test to determine the hardness of bovine bone and Fourier transform Infrared spectroscopy (FTIR). Spectra were collected in the midinfrared range in Attenuated Total Reflectance (ATR) sampling mode associated whit PCA multivariate technique to evaluate the molecular changes in bone matrix. The microhardness analysis did not present a significant statistical difference between the irradiated and control groups, showing that ionizing radiation did not affect the mechanical structure of the samples, on a micro scale. The results of FTIR with the PCA technique were effective in separating all groups, especially those irradiated with doses of 0.002 kGy, 10 kGy and 35 kGy. We conclude that ATR-FTIR spectroscopy associated with PCA is a good method to evaluate the biochemical changes promoted by ionizing radiation in bone matrix. It was observed that hardness was not altered by gamma irradiation and FTIR spectroscopy associated with PCA is a good method to analyze the changes in bone tissue submitted to ionizing radiation. CEPID/FAFESP 05/51689-2, INCT/CNPq 573.916/2008-0 and CNPq 830615/1999-7 supported this work.