

EFFECTS OF EXTERNAL BEAM IRRADIATION ON A NEW MATERIAL FOR BREAST RECONSTRUCTION : AN EXPERIMENTAL ANIMAL MODEL

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Two experiments were performed to evaluate if a new prosthetic material, a biopolymer, could tolerate radiation equally as normal tissues, if the dose distribution would be satisfactory in the volume where the prosthesis was placed and if the surrounding tissues would be altered with consequent poor outcome. The first evaluated the interaction of ⁶⁰Co photons with the biopolymer up to a dose of 50 Gy. The second was performed on CD1 female mice, to evaluate acute and late effects on animal tissues and potential deformability of the material with radiotherapy given before or after its implant into the mammary fat pad. The treated mice received 30 Gy/10 fractions/12 days to the chest wall, where the implant was placed, using a 120 kV/20mA orthovoltage X-ray source, with a 4 mm Al filter, and AP/PA 3 cm of diameter fields, at a source to axis distance of 30 cm. At 15 and 90 days mice were euthanized and submitted to necropsy. Toxicity was evaluated considering haematological and biochemical changes and histological lesions of tissues surrounding the implant, bone marrow, skin, heart, lungs, liver, spleen and kidneys. A great effort has been done to compare life expectancy of the animals to that of humans: we stated that 90 days of mice's life could be compared to 10 years for men. The biopolymer acted as tissue-equivalent with a linear attenuation coefficient no different from that of water. Yellowing and a 25% reduction of its diameter were observed after 4 months from radiation. Biochemical and histological analysis performed on mice for acute and late toxicity showed a lack of effects by radiotherapy on blood parameters and organs, as well as on the biopolymer and the surrounding tissues.