

IMPROVEMENTS IN THE QUALITY CONTROL OF IRIDIUM-192 WIRE USED IN BRACHYTHERAPY

Osvaldo L. Costa¹, Carlos A. Zeituni^{1,2}, Maria Elisa C. M. Rostelato¹, João A. Moura¹,
Anselmo Feher¹, Eduardo S. Moura¹, Carla D. Souza¹, Samir L. Somessari¹

olcosta@ipen.br

¹Instituto de Pesquisas Energéticas e Nucleares – IPEN/CNEN - SP
Avenida Professor Lineu Prestes, 2242 ZIP 05508-000 São Paulo, SP - Brazil.

²Instituto Presbiteriano Mackenzie
Rua da Consolação, 930 ZIP 01302-907 São Paulo, SP - Brazil

Brachytherapy is a method used in the treatment of cancerous tumors by ionizing radiation produced by sources introduced into the tumor area, this method seeks a more direct attack to the tumor, thereby maximizing the radiation dose to diseased tissue while minimizing the dose to healthy tissues (1). One of the radionuclides used in brachytherapy is iridium-192. The Radiation Technology Center (CTR) of the Nuclear and Energy Research Institute (IPEN) has produced commercially, since 1998, iridium-192 wires used in low dose rate (LDR) brachytherapy (2). To produce this radionuclide, firstly a iridium-platinum wire is irradiated in the nuclear reactor IEA-R1 for 30 hours with a neutron flux of $5 \times 10^{13} \text{ n cm}^{-2} \text{ s}^{-1}$, the wire is left to decay by 30 days to remove the main contaminants and then goes through a quality control before being sent to the hospital. In this quality control is checked the radiation homogeneity along each centimeter of the wire (3). To implement this procedure is used a device consisting of an ionization chamber surrounded by a lead shield with a small 1 cm wide slit, linked to the ionization chamber is a voltage source and a Keithley 617 electrometer, 2 minutes is the range used to measure the charge by the electrometer. The iridium wire is considered in accordance when there is no variation greater than 5% between the average measures and the maximum and minimum values. However, due to design features of the measurement system, the wire may appear to the detector through the slit in larger sizes than the ideal, improperly influencing the final quality control. This paper calculates the difference in size of these variations in profile and their influence on the final count, it compares the actual values obtained and describes the improvements made in quality control procedures that provided more accurate measurement data, analyzes the results and suggests changes in devices aimed at further improving the quality control of iridium-192 wires produced at IPEN and used in hospitals in Brazil.

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