

Development and production of radioactive sources for cancer treatment in Brazil

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Every year, the number of cancer patients increases in Brazil and some of these patients are treated with Brachytherapy using Iridium -192 wire sources and Iodine-125 seeds.

Brachytherapy is a kind of lesion treatment based on the sources insertion in the tumor. These sources can be activated iridium wires or iodine seeds. During this process, the ionizing radiation destroys the malignant cells very efficiently.

The Energy and Nuclear Research Institute – IPEN, which belongs to the Nuclear Energy National Commission – CNEN, established a program for the development of the technique and production of Iridium -192 wire sources and Iodine-125 seeds in Brazil.

The purpose of this program is to develop the technique and to establish a laboratory for the production of Iridium – 192 sources and Iodine-125 seeds. This project target is to enable the country with the production of these sources, making the products accessible to clinics and hospitals, with low costs for the Brazilian people reality.

With the purpose of settling a laboratory for Iridium –192 sources production, a wire activation method was developed and a hot cell for the wire manipulation, quality assurance and packaging was built. The wire activation was carried out in our nuclear reactor, IEA-R1m. These sources are usually shaped as flexible wires 0.3mm diameter and 50.0cm long. The specific activity, for a low dose rate (LDR) therapy, is between 1mCi/cm and 4mCi/cm.

The Iodine-125 seeds consist of a titanium capsule of 0.8 mm external diameter, 0.05mm wall thickness and 4.5mm long. The inner capsule houses a silver thread, 3.0mm long and 0.5mm diameter, containing the adsorbed 125-Iodine. The typical seed apparent activity is of 0.4mCi (14.8MBq), with a recommended variation of about 5% at most, in a same lot of seeds.

During the project execution, the following methods were developed: the seed core (silver) cutting, the titanium tube cutting, the iodine immobilization through its deposition in silver substrate and the sealing of the seeds through welding process, so that the classification of the seeds, as sealed sources, and the leakage tests could be done according to the international norms.