

Dosimetric study of a brachytherapy treatment of esophagus with Brazilian ^{192}Ir sources using anthropomorphic phantoms

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At the IPEN several radioisotopes are produced for use in medical treatments, including ^{192}Ir sources. These sources are suitable for brachytherapy treatments, due to their low or high activity, depending on the concentration of ^{192}Ir , easiness to manufacture, small size, stable daughter products and the possibility of re-utilization. They may be used for the treatment of prostate, cervix, head and neck, skin, breast, gallbladder, uterus, vagina, lung, rectum and eye. In this work, the use of the brachytherapy source produced at the IPEN was studied for the treatment of esophagus cancer, especially the dose determination of important structures, such as those on the mediastinum. The dose distribution was evaluated with the use of both MASH and FASH anthropomorphic phantoms [1,2], and using the MCNP5 Monte Carlo code to transport the radiation through matter. The results

showed a distribution of doses in some organs, considering a 100% dose on the esophagus cancer, as follows: 0.1% bone-marrow, 0.3% colon, 6.2% lung, 2.4% stomach, 1.3% breast, 0.1% gonadas, 1.0% bladder, 2.6% liver, 3.5% thyroid, 5.1% bone, 0.1% brain, 0.6% salivary gland, 0.4% skin and 11.5% for the heart. These results indicate a small dose distribution to important tissues; therefore, the ^{192}Ir sources produced at the IPEN show usefulness for esophagus brachytherapy.

References

1. Cassola, V.F., de Melo Lima, V.J., Kramer, R. and Khoury, H. J., *Phys. Med. Biol.* 55(2010) 133-162
2. Cassola, V.F., Kramer, R. and Khoury, H.J., *Phys Med Biol* (2010) 55 4399-4430.