

33rd Nursing and Healthcare Congress

October 23-25, 2017 | Toronto, Canada

Difference between HDR Ir-192- and Co-60 sources for high dose rate brachytherapy machine

Md Safiqul Islam¹, Mohammad Amran Hossain² and Md Faridul Islam³

¹National Institute of Cancer Research & Hospital, Bangladesh

²Dhaka Medical College, Bangladesh

High Dose Rate (HDR) Brachytherapy is used for cancer patients. In our country's prospect only cervix and breast cancer treatment is done by using HDR. The air kerma rate in air at a reference distance of less than a meter from the source is the recommended quantity for the specification of gamma ray source Ir-192 in brachytherapy. The absorbed dose for patients is directly proportional to the air kerma rate. Therefore the air kerma rate should be determined before the first use of the source on patients by qualified medical physicist who is independent from the source manufacturer. The air kerma rate will then be applied in the calculation of the dose delivered to patients in their planning systems. In practice, high dose rate (HDR) Ir-192 afterloader machines are mostly used in brachytherapy treatment. Currently HDR-Co-60 increasingly comes into operation too. The essential advantage of the use of Co-60 sources is its longer half-life compared to Ir-192. The use of HDR Co-60 afterloading machines is also quite interesting for developing countries. This work describes the dosimetry at HDR afterloading machines according to the protocols IAEA-TECDOC-1274 (2002) with the nuclides Ir-192 and Co-60. We have used 3 different measurement methods (with a ring chamber, with a solid phantom and in free air, and with a well chamber) in dependence of each of the protocols. We have shown that the standard deviations of the measured air kerma rate for the Co-60 source are generally larger than those of the Ir-192 source. The measurements with the well chamber had the lowest deviation from the certificate value. In all protocols and methods the deviations stood for both nuclides by a maximum of about 1% for Ir-192 and 2.5% for Co-60-Sources, respectively.

mslitu007@gmail.com

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