

## **Calibration of Ir-192 HDR Source based on Standards of Absorbed Dose to Water**

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Brachytherapy sources are usually calibrated in terms of the measured air-kerma strength SK in free space at 1 m distance. The trend of the protocols for the external beam radiotherapy has been changing from an air\_kerma base to standards of absorbed dose to water. In this work we tried to specify the source strength of Ir-192 source in terms of the absorbed\_dose\_to\_water instead of an air kerma strength using standards of absorbed dose to water. For this work the MPBP(the Multi Purpose Brachytherapy Phantom) was home-made, which was designed to put both sources and chambers into water at the exact point we want. The reference point was chosen at 5 cm distance along the transverse axis of the source. The computer system of Plato RTP, BPS v13.2, Nucletron, Holland, was used to deliver the dose we want to the reference point. The absorbed\_dose\_to\_water calibration factor NDW of ionization chambers for brachytherapy sources used must be determined in order to apply standards of absorbed dose to water. The PTW TN 30013 chamber was used and the calibration factor NDW of the chamber was determined using the Monte Carlo Code of EGSnrcCPP. The factor calculated was then used to determine the absorbed dose to water, which calculated an air kerma strength for an Ir-192 source at the reference point. The dose calculated was compared with the dose delivered by Plato RTP. The dose delivered to the reference point by the computer system used was 100 cGy. The calibration factor NDW calculated was 5.28 cGy /nC and was used to calculate the absorbed doses at some distances, which show 2.16% to 0.84% difference from the dose delivered. Air kerma strength calculated showed the difference from -2.7% to +1.7% relative to the one of the source provided by a vendor. This shows the feasibility of using standards of absorbed dose to water to calibrate the brachytherapy source.

**Keywords :** Brachytherapy Source, Air Kerma Strength, Absorbed Dose to Water Calibration Factor