

AbstractID: 13970 Title: Validation of Intrabeam® bare probe 50 kVp x-ray source delivered dose and vendor calculated dose, using reference dosimetry in a water-equivalent phantom.

Purpose:

The ZEISS Intrabeam® is a 50 kVp x-ray source intended for interstitial brachytherapy. The purpose of this work is to make independent measurement of absolute dose rates in water-equivalent phantom for validation and commissioning of the dose calculation software provide by the manufacturer.

Method and Materials:

Measurements were made by placing an ionization chamber into a Plastic Water phantom (formulation DT) parallel to the applicator shaft and at a fixed distance. Our prior work had established very good water-equivalence of the DT resin at the energy of the Intrabeam. Two different chambers were used: PTW 23342 parallel plate ion chamber (PPIC) and A1SL cylindrical ion chamber. The PPIC was positioned at 1 or 2 cm from the nominal target to the chamber front surface. The A1SL IC was positioned at 1.5, 2.5 and 3.5cm from probe isocenter to chamber center. Measurements were made for 2 minute exposures. Readings from the IC's were converted to dose in water using the formula $D_w = M \times N_k \times K_Q \times (\mu_{en, water} / \rho) / (\mu_{en, air} / \rho)$. The average spectrum of the beam was assumed to be 20keV. The PPIC was calibrated with at 30kVp beam while the A1SL was calibrated at 50kVp. At this energy range $K = K_c$ thus dose in air is assumed to be dose in water.

Results:

The computed dose and vendor-supplied depth dose data were converted to dose rate and compared at our measurement depths. The individual point doses varied from $-0.1 \pm 3\%$ to $8.2 \pm 5\%$ from our measurements. The A1SL cylindrical chamber measurement point shifted 2.5mm upstream from IC center.

Conclusion:

Dosimetry with the PPIC and A1SL IC agreed with vendor calculated data. Our results validate the dose calculation software provided by the manufacturer, confirming suitability for clinical use.