Abstract ID: 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 where converted to dose in water using the formula \(D_w = M \times N_k \times K_q \times (\mu_{en,\text{water}} / \mu_{en,\text{air}})\). 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 where converted to dose rate and compared at our measurement depths. The individual point doses varied from -0.1 ± 3% to 8.2 ± 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.