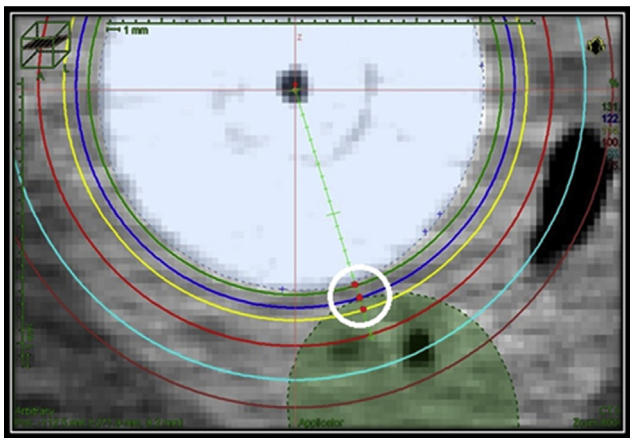

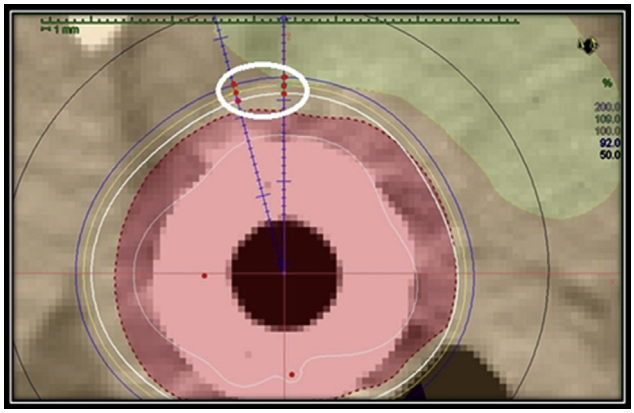

Results: Central axis
Results: Avg. dose variation- 15.77%; Minimum variation- 11.10%; Maximum variation- 23.14%.Off axis
Results: Avg. dose variation- 16.84%; Minimum variation- 11.74%; Maximum variation- 27.69%
Conclusions: This study data suggest that an improvement of the immobilization devices for HDR is absolutely necessary. Developing new immobilization devices for the applicators is also recommended. We are looking into possible collaboration with several immobilization devices manufacturers in this regard.

PO37

Dose Measurements for an Ir-192 Source Using Mosfets, Radiochromic Films, TLDs and Heterogeneous Tissues

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Purpose: Recently, Beaulieu et al. (2012) published an article (TG-186) providing guidance for Medical-Based Dose Calculation Algorithms (MBDCAs), where tissue heterogeneity considerations are addressed. It is well-known that TG-43U1 (Rivard et al., 2004) formalism which considers only water medium is limited and significant dose differences have been found comparing both methodologies. The aim of the present work is to experimentally quantify dose values in heterogeneous medium.
Materials and Methods: All experiments have been simulated using the MCNP5 Monte Carlo code and performed using radiochromic films, TLDs and MOSFETs within heterogeneous phantoms composed by PMMA, lung, muscle, adipose tissue, breast and 2 types of bone. Film dosimetry has been performed using two methodologies: a) linearization for dose-response curve (Devic and Tomic, 2012) based on calibration curves to create a functional form that linearizes the dose response and b) multichannel analysis dosimetry (Micke et al., 2011).
Results: Comparison of experimental results are in good agreement with calculated dose values with MCNP5 with maximum discrepancies less than 10% for all dosimeters. Film multichannel analysis dosimetry allowed to address not only disturbances in the measurements caused by thickness variation in the film active layer, but also, separate other external influences in the dose while the liberalization method reduced considerably the experimental uncertainty be avoiding the calibration procedure.
Conclusions: High accuracy dosimetry can be performed using brachytherapy sources even when dose measurements are highly sensitive to experimental uncertainties due to high dose gradient and may lead to large errors when well defined measurement protocols are not followed for each dosimeter.

PO38

Bladder and Rectal Dose Estimations on Digitized Radiographs for Adjuvant Vaginal Brachytherapy after Hysterectomy

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Purpose: To evaluate the feasibility of accessing bladder and rectal point doses, using orthogonal radiographs without treatment planning for vaginal cylinder applicator (VC) adjuvant high-dose-rate (HDR) vaginal cuff brachytherapy (BT) after hysterectomy.
Materials and Methods: Thirty-three treatment plans of VC HDR BT from 31 postoperative endometrial cancer patients were retrospectively analyzed. Single-channel VC (Varian Medical Solution, Inc.) with differing diameters - 2.0 cm (VC-2.0cm), VC-2.3cm, VC-2.6cm, and VC-3.0cm were analyzed. ICRU bladder and rectal points were defined based upon ICRU report #38. A closest point on the rectal catheter to the VC was also analyzed. Dose-distance modeling was performed to estimate bladder and rectal point doses by measuring distances on each orthogonal radiograph without treatment planning. Dose-distance modeling was constructed based on inverse squarelaw that the dose is inversely proportional to the distance from the source. The estimated doses obtained from dose-distance modeling were compared with the doses calculated on treatment planning system (TPS) (BrachyVision, Varian Medical Solution, Inc.). Their percent dose differences were recorded. Analysis was performed for each VC size, ICRU bladder and rectal points, and the closest rectal point.
Results: Percent dose differences between the estimated values via dose-distance modeling and the TPS values were on average 1.9% and 2.5% for ICRU bladder and rectal points, respectively, regardless of VC sizes. Their correlation coefficients (estimated doses vs. TPS doses) were observed as higher than 0.98, regardless of VC sizes. The dose-distance modeling plots were presented in Figure 1-A and percent dose differences were summarized in Figure 1-B. For ICRU bladder point, VC-2.3cm presented the minimal difference (1.1±1.0%), while VC-2.0cm presented the maximal difference (2.5±2.0%). As for ICRU rectal point, percent dose differences were minimal (1.8±1.0%) for VC-2.6cm and maximal (3.3±2.0%) for VC-2.0cm. When using a closest rectal point, percent dose differences increased (from 2.5% to 5.4%). VC-2.3cm presented considerably high dose differences from TPS (9.3±4.6%).
Conclusions: It was feasible to estimate rectal and bladder point doses by measuring distances on orthogonal radiographs without treatment