simulated errors had gamma values greater than 1, and fail the criteria. In addition to dwell positions and times analysis, the system was capable of determining the transit time between dwell positions and its effect on the estimated dose delivered when compared against the treatment plan.

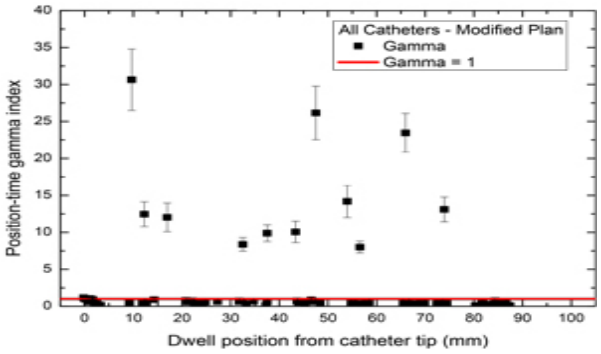

Figure 1 - The position-time gamma analysis of the modified plan.

Conclusions: Our application of the developed quality assurance system 'magic phantom', to HDR brachytherapy has demonstrated ability to perform the verification of all HDR treatment plans. This device has shown potential to be the comprehensive QA solution for the entire treatment delivery, with further development of this system focused on real time *in vivo* source tracking.

OC-0273

Commissioning of a model-based dose calculation algorithm for brachytherapy according to the TG-186 report

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Purpose/Objective: One of the important proceedings of brachytherapy during the last years was the clinical implementation of modern planning algorithms. To provide guidelines to the medical physicist the AAPM TG-186 published a report that describes procedures for commissioning new treatment planning algorithms (TPSs) in brachytherapy. To evaluate the guidance of this report from the end-users perspective we describe in this work the commissioning process of a commercial model-based dose calculation algorithm (MBDCA) for an HDR afterloading device in our clinic according to TG-186. We furthermore study complemental dose measurements.

Materials and Methods: The TPS BrachyVision v11.0.47 utilizing the dose calculation algorithm Acuros v1.5.0 for an Ir-192 HDR GammaMedplus afterloader (Varian Medical System, Palo Alto, CA) was used for this study. In the first step the commissioning process, as recommended by the TG-186 report, was followed for level 1. Dose comparisons between TG-43 formalism and Acuros were carried out in water medium for a single source scenario of 40700 U. Moreover hand calculations were performed for several points of interest using along away table for the relevant TG-43 consensus data.

Measurements in a water tank (40x40x40 cm^3) using a Semiflex chamber, type 31010, (PTW Freiburg, Germany) were conducted. Dose measurements are in particular of interest to validate the impact of heterogeneities in the Acuros module. They were carried out at various points of interest, laterally and distally positioned from the source. Therefor the source was either positioned in an implant needle made of steel or in a shielded 90° vaginal cylinder of 3.5 cm diameter. This shielded cylinder is also virtually available for dose calculation as template in the applicator library of the BrachyVision/Acuros system.

Results: Results of computations and measurements in water are summarized in Table 1. Hand and TG-43 based calculations are close to results of the Acuros computations (better than 2% for all points). As expected, dose measurements close to the source show deviations (about 30% at 1,14 cm), but reached reasonable accuracy at longer distances (e.g. 5% at 7,11 cm).

Dose values behind the shielding of the vaginal applicator are shown in Figure 1. Good agreement was reached between measurements and the results of the MBDCA. TG-43 formalism takes heterogeneities not in to account, so the computed doses are not accurate behind the shielding.

r [cm]	TG 43 [Gy]	TG-43 Hand calculation [Gy]	Acuros [Gy]	Measurement [Gy]
1,14	5,864	5,884	5,865	3,975
2,13	1,689	1,681	1,704	1,520
3,12	0,790	0,782	0,795	0,714
4,12	0,451	0,450	0,455	0,422
5,11	0,292	0,292	0,295	0,266
6,11	0,203	0,204	0,204	0,190
7,11	0,148	0,150	0,149	0,141
9,11	0,088	0,092 (*)	0,087	0,082
11,11	0,057	0,062 (*)	0,056	0,053

Table 1: Overview on calculated and measured dose points for lateral distances *r* from the HDR GammaMedplus source. Hand calculated values from the along away QA tables indicated with (*) are extrapolated.

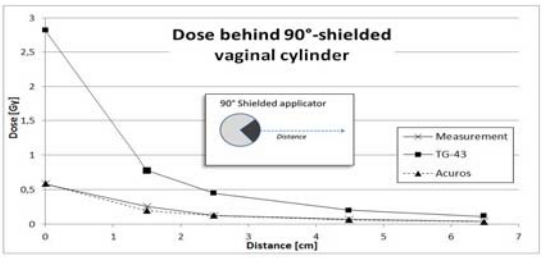

Figure 1: Results of dose calculations and measurements in a water tank behind a 90°- shielded vaginal cylinder. One distal dwell position of 60 s for the 40.700 U source was used. The distance is measured to the surface of the applicator.

Conclusions: Commissioning of a MBDCA is well feasible when following the TG-186 report, level 1. In addition dose measurements in water can complete the procedure to check the impact of heterogeneities in the medium.

Proffered Papers: Brachytherapy 7: Gynaecology

OC-0274

Development of rectal dose surface maps combining cervical external beam and brachytherapy doses

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Purpose/Objective: Dose surface maps (DSM) provide spatial features of the rectal wall dose distribution which has been shown to correlate with tissue toxicity in different ways (Buettner et al 2009). This study aims to develop the methodology and assess feasibility of using DSM to accumulate rectal wall dose from both external beam radiotherapy (EBRT) and brachytherapy (BT) in cervical cancer patients. This was previously not possible using conventional dose volume histogram due to lack of spatial information and challenges with anatomical difference between the two therapeutic modalities.