

**Results:** The ACDS achieved or exceeded all the initial pilot requirements. More than the required number of audits at each level were performed over the initial three years. The audit outcomes will be presented detailing the impact the ACDS audits, and resulting recommendations, have had on radiotherapy practice. The paper will also present on how the staff within the ACDS engaged with the professional clinical workforce and provided a successful and functioning audit service. The paper will attempt to identify these social successes and how these were achieved. This will provide details to assist and advise those seeking to design or modify national or regional auditing programs. Finally the paper reviews the potential future for the ACDS.

**Conclusion:** The raw number of audits indicate that the ACDS met the pilot program's initial auditing requirements. Understanding the reasons for the ACDS' success are also important for ensuring an on-going service or informing and assisting others to establish auditing services. Within the ACDS, success has been highly dependent on: attracting quality staff who can respond with agility to changing situations, a high level of communication with the professional community, and a high level of engagement by the community.

*The Australian Clinical Dosimetry Service is a joint initiative between the Department of Health and Ageing and the Australian Radiation Protection and Nuclear Safety Agency*

#### EP-1560

Is EBT-XD film suitable for linac and Gamma Knife radiosurgery dosimetry verification and audit?

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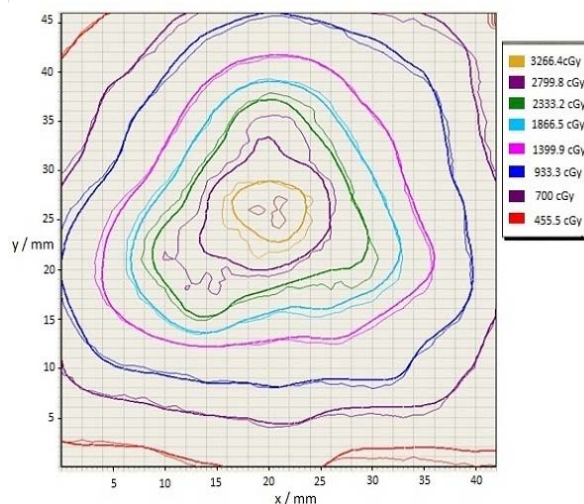
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**Purpose or Objective:** The validation of radiotherapy treatments by dosimetric measurement is essential for the introduction of new techniques, pre-treatment verification and dosimetry audit. Film dosimetry has the advantage of high spatial resolution, low energy dependence and water equivalence. A new film (EBT-XD) has been assessed for its suitability for dosimetry of stereotactic radiosurgery (SRS) applications.

**Material and Methods:** Calibration curves for red, green and blue channels were created in the range of 0-4000 cGy for EBT-XD and its predecessor EBT3. Ten film pieces were irradiated in a nominal 6MV linac. The film was scanned using an EPSON Expression 11000XL scanner and the analysis was performed in FilmQA Pro software (Ashland ISP Inc, NJ, USA). Film dosimetry uncertainties were assessed for typical SRS fields, including lateral scanner effect at high doses. Both EBT-XD and EBT3 films were used in-phantom for treatment dose verification of typical Linac based and Gamma Knife (GK) stereotactic radiosurgery within the STE2EV anthropomorphic phantom (CIRS, VA, USA). The dosimetry methodology for a forthcoming UK dosimetry audit of SRS treatment was utilised.

**Results:** EBT-XD film has lower optical density than EBT-3 throughout the dose range tested. EBT-XD was more suitable for high-dose applications because of a lower lateral scanner uncertainty. For the width of the film sizes that will be used in the SRS audit (50 mm) and the typical doses measured, the lateral scanner effect was estimated to be of the range of 0.5% for EBT-XD and 3% for EBT-3. Higher agreement between TPS and film dose distributions was seen for EBT-XD using both single and triple channel dosimetry at 2% (local normalization), 1 mm gamma index analysis criteria, with the recommended triple channel used for EBT-XD having a 95.5% passing rate, compared to conventional single channel EBT3 having only 89.1%. Single channel EBT-XD had 89.7% passing rates and triple channel EBT-3 38.9%. An example is shown in figure 1, of EBT-XD showing a 98.3% gamma passing rate for a GK radiosurgery plan at 3% (local), 1.5 mm criteria



**Conclusion:** We have evaluated the use of a new film, EBT-XD, for SRS dosimetry verification and demonstrated its suitability for a forthcoming audit of radiosurgery services in the UK. EBT-XD is less susceptible to lateral scanner effects and shows better agreement to TPS dose distributions than EBT-3 in linac-based radiosurgery dose verifications. EBT-XD also showed excellent agreement with TPS dose distributions in GK radiosurgery.

#### EP-1561

Online control point resolved VMAT QA using the integral quality monitor and log files

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**Purpose or Objective:** To systematically assess VMAT delivery accuracy using dynamic benchmark test plans.

**Material and Methods:** Three VMAT benchmark plans were generated for an Elekta Synergy linac (MLCi2) using iComCAT. These plans consist of square field shapes with varying field size and a full gantry rotation (fig.1a). First, 19 control-points (19cp) were composed to vary dose rate, MLC positions, jaw and gantry speed to push dynamic parameters to their limit. Next the number of control-points was increased (i.e. 37cp and 73cp) by linear interpolation so that MLC, jaw and gantry motion were identical to the 19cp plan, but with tighter regulation of dynamic components. MLC and jaw errors were quantified by analyzing the linac's log files. For dosimetric measurements, a 2D ionchamber array placed in a full scatter phantom (729 & Octavius, PTW) and the integral quality monitor (iQM, iRT) were used. The iQM contains a large area ionchamber and an inclinometer for real-time VMAT verification. Evaluation was performed on the level of cumulated delivery and control-point resolved to investigate the effect of increasing number of control-points.

**Results:** Slight variations in delivery were observed for the three plans from log-file analysis, overall revealing very accurate linac control in rotational mode. The mean MLC error was almost identical for the three plans (0.2±0.2mm). Relative dosimetric evaluation by means of plan reproducibility resulted in  $\gamma_{\text{mean}}=0.4\pm0.1$  (19cp),  $\gamma_{\text{mean}}=0.2\pm0.0$  (37cp) and  $\gamma_{\text{mean}}=0.1\pm0.0$  (73cp) for the local  $\gamma$  1%/1mm criterion, respectively. Increased  $\gamma$ -values were found for inter-plan comparison: