broader dose range (double) than the two existing gel compositions used for 3D Gel dosimetry applications. Also, the novel gel composition showed no apparent change in response with post-irradiation time.

Conclusions: An experimental setup could be established for reproducible cell irradiations in FF and FFF mode with sufficient dose homogeneity, without altering the beam itself or by the use of compensators or intensity modulation. Furthermore, this experimental setup enables simulation of different oxygen conditions. So far, no difference in survival of HaCaT cells was detected between irradiation with FFF or FF beams.

PD-0384
A phantom suitable for cell survival investigations using flattened and unflattened photon beams
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Purpose/Objective: Recently, a number of studies investigating the difference in cell survival after irradiation with unflattened (FFF) compared to flattened beams (FF). Most of these studies were, on the one hand, performed under 'normal' oxygen conditions (21 %) and, on the other hand, dose homogeneity was often established using compensators or intensity modulation. The reproducibility of such setups has not yet been investigated. The aim of this study was to design a phantom capable of establishing hypoxic and normoxic conditions, providing a region of homogeneous dose distribution using static fields only and the possibility to precisely monitor the delivered dose to the cells for each experiment.

Materials and Methods: A VersaHD (Elekta, Crawley, UK) linac was utilized, which was commissioned to produce 10 MV FF and FFF beams. Doses of 0.5, 1, 2, 4 and 6 Gy were delivered to HaCaT (human keratinocytes) cells from a gantry angel of 180° using a static 10x10 cm² field. The cells were grown and irradiated in chamber slides, which consist of two wells each with inner dimensions of 2x2 cm². Only one well was used for the cells, the other one was filled with culture medium to provide scatter material. A PMMA insert was manufactured to fit the chamber slide between solid water slabs in a depth of 10 cm. Two holes were drilled through the PMMA insert in order to provide gas exchange, either ambient air for normoxic or nitrogen for hypoxic conditions. Dose homogeneity was often established using compensators or intensity modulation. The reproducibility of such setups has not yet been investigated. The aim of this study was to design a phantom capable of establishing hypoxic and normoxic conditions, providing a region of homogeneous dose distribution using static fields only and the possibility to precisely monitor the delivered dose to the cells for each experiment.

Results: The film measurements showed that when using the chamber slides it is possible to establish an isolated region with cells where a dose homogeneity within ± 2% can be achieved even in FFF mode. The Farmer chamber measurements revealed a reproducibility of the dose between the individual cell irradiations within 0.5%. Alpha values of 0.16 and 0.11 were determined of cells irradiated with FF (dose rate ~4 Gy/min) and FFF beams (dose rate ~16 Gy/min), respectively. Both values agreed within their uncertainty. Beta values were 0.05 for both FF and FFF beams.

Conclusions: An experimental setup could be established for reproducible cell irradiations in FF and FFF mode with sufficient dose homogeneity, without altering the beam itself or by the use of compensators or intensity modulation. Furthermore, this experimental setup enables simulation of different oxygen conditions. So far, no difference in survival of HaCaT cells was detected between irradiation with FFF or FF beams.

PD-0384
The XX Postal TLD Audit Programme: analysis of 10,660 results
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Purpose/Objective: With the aim of improving the accuracy and consistency of clinical dosimetry in hospitals world-wide, the XX Thermoluminescence Dosimetry (TLD) Postal Audit Program has been operating since 1969. In this study, we explore the dependence of the quality of clinical dosimetry in participating institutions on several key infrastructure characteristics.

Materials and Methods: The Postal Audit Program compares the dose read from the mailed TLD with that stated to have been delivered by the Institution. Agreement to within ±5% is regarded as being acceptable with larger deviations triggering follow-up actions. Of particular interest in this study was the dependence of clinical dosimetry quality on i) age of the treatment machine, ii) 60Co vs linac, iii) number of machines in the participating centre, iv) elapsed time since the last dosimetry system calibration v) whether the audit was the first one or a subsequent one and vi) the dosimetry protocol used (a sub-set of 7182 TLDs). Quality, in this context, is defined as the percentage of results within the XX’s criterion of acceptability of ±5%. Also, it is to be noted that the term ‘clinical dosimetry’ encompasses calibration of the institution’s beam, the institution’s dosimetry calculations and irradiation of the Postal Audit TLDs as it was clearly not possible to isolate these different contributors to the final result.