

AbstractID: 5127 Title: Implementation of Good Laboratory Practice standards for improving dosimetry in Radiobiology lab

Purpose: Accuracy of radiation dosimetry in radiobiology lab needs to be improved so that the results can be reproduced at different labs and translated into clinic. In this work we establish dosimetry procedures and improve accuracy of radiation delivery in a radiobiology lab based on the Good Laboratory Practice (GLP) requirements.

Method and Materials: GLP guidelines and AAPM protocols were used to collect dosimetry data and to establish dosimetry procedures for routine quality assurance and for documenting delivery dose. A radiation field analyzer (Scanditronix) was used to characterize x-ray beams produced by a Pantak HF320 orthovoltage system in the Radiobiology lab of the Medical College of Wisconsin. The relative dosimetry data were measured with an ionization chamber suitable for the kilovoltage x-rays. A software method was developed to generate 3D isodose distributions. The absolute dosimetry measurements were performed using a Farmer ionization chamber calibrated in a standard dosimetry lab. The absolute doses were determined using the AAPM TG-61 protocol. The QA procedures were established according to the GLP standards and based on AAPM TG-40 protocol.

Results: Accurate relative dosimetry data including depth doses, profiles, and isodose distributions for a variety of energies, filters, collimators and source-to-surface distances were obtained. Isodose distributions were generated for various opposite parallel fields irradiating phantoms with different thicknesses. Absolute doses were determined for a series of irradiation situations. These data facilitated accurate planning of animal irradiations and documentation of the delivered doses. Periodic QA procedures were established.

Conclusion: We have collected essential dosimetry data and have established procedures for routine QA and dose documentation under the GLP standards. Thereby we improved the dosimetry in the Radiobiology lab to the level seen in the clinical setting. This work will facilitate accurate dose delivery, reproducibility of the results, and direct transfer of animal data into the clinic.