AbstractID: 4354 Title: Verification of Cell Irradiation Dose Deposition Using Radiochromic Film

Purpose: A standard technique for cell survival curve determination is based on the cell culture technique. Survival curve is reconstructed by plotting the fraction of surviving cells as a function of delivered dose. We describe a technique that irradiates all cells at once by using two wedges (static and dynamic wedge concurrently) on a linear accelerator whereby we irradiate the multi-compartmental dish to a desired dose range from 1 - 5 Gy. We also employed EBT model GAFCHROMIC^{TM} film to verify the dose delivered in each of the compartments within the dish. Our technique overcomes the problem of possible contamination during the re-plating after irradiation and all cells are kept under the same conditions.

Method and Materials: Cells, plated within a multi-compartmental (8 x 12) dish were irradiated using a 6 MV photon beam employing a combination of 60^{o} physical ("static") wedge and 60^{o} Enhanced Dynamic Wedge. A 10 cm by 12.5 cm piece of EBT film was positioned below cells. Spatial dosimetry was performed using the AGFA Arcus II document scanner. The change in optical density of the unexposed film piece was subtracted from the exposed film piece to obtain the final *netOD* that was converted to dose using previously determined calibration curve for the reference type dosimetry.

Results: Technique described delivers a dose gradient ranging from 1 Gy within the first compartment to 5 Gy within the last compartment. Maximum relative uncertainty of 2% was observed at 5 Gy.

Conclusions: In this work, we describe a technique using a combination of static and dynamic wedge to obtain doses necessary to reliably perform MTT Assay in a dose range from 1 Gy to 5 Gy within a multi compartmental dish. We have also described a method to verify the dose delivered using the EBT model radiochromic film.