AbstractID: 4553 Title: Fractionated Grid Therapy in Treating Cervical Cancers

Purpose: To evaluate the potential therapeutic advantage of external beam grid therapy in treating cervical cancer in comparison of conventional open field radiotherapy.

Method and Materials: A Monte Carlo technique was employed to calculate 2-dimensinal dose distribution of a commercially available grid, and the linear-quadratic (LQ) model was applied to study the therapeutic advantage of using grid therapy for treating cervical cancers. A list of cervical cancer cell lines with known LQ parameters were used to calculate the radiotherapy response. Acutely responding normal muscle with α/β value of 3.1 Gy was used to evaluate the outcomes of between the open and grid field irradiations. The normal muscle tissue with three different sensitivities was assumed according to their response to a 2Gy open field. The therapeutic ratio based on sparing normal cells has been defined and calculated. The treatment regimens with 2Gy per fraction and 5 to 20 fractions were used in the calculations.

Results: The survival fractions of normal tissues as well as tumor cells in the open and grid field are calculated. An appreciable therapeutic advantage has been demonstrated. Therapeutic ratio up to 9.5 for radio-sensitive normal muscles was found. However, the radio-resistant muscle does not show apparent advantage benefiting from the grid therapy. The results of data analysis showed that the therapeutic outcome depends not only on the single value α/β, but also on the individual α and β values of both the tumor and normal tissue cells.

Conclusion: Monte Carlo technique was proven to be able to provide the dosimetric characteristics for grid therapy. The grid therapy in this study was found to be advantageous for treating the acutely responding cervical tumors ($\alpha/\beta>6$), but not for slow responding ones ($\alpha/\beta\leq6$). The acutely responding tumors and radio-sensitive normal tissues are more suitable for using the grid therapy.