AbstractID: 6771 Title: Fractionated Grid Therapy in Treating Cervical Cancers: Hypo-fractionation or Conventional fractionation?

**Purpose:** To evaluate the hypo-fractionated and conventionally fractionated grid therapy in treating cervical cancers.

**Material and methods:** A Monte Carlo technique was employed to calculate dose distribution of a commercially available grid. Based on the previously validated Monte Carlo technique, our new study has considered the divergence of all holes and thus improved the accuracy of grid geometry description in the simulations. The linear-quadratic (LQ) model is used to evaluate the therapeutic outcome of both the hypo-fractionated (fewer fractions and higher dose/fraction, herein 15 Gy/fraction) and conventionally fractionated (2Gy/fraction) regimens using grid therapy to treat cervical tumors that were represented by different radio-biological responses.

**Results:** The dose profiles and 2D dose distributions at dmax ( d=1.5 cm) and 5 cm depths in water were obtained. An excellent agreement of dose profiles between calculated and measured was confirmed. The tumor cell and normal tissue survival statistics of grid therapy for two types of treatment regimens were calculated using the 2-D dose distributions at the depth of 5 cm, and the therapeutic ratios and equivalent open field doses were obtained.

**Conclusions:** The consideration of the divergence of grid holes has improved the Monte Carlo simulation results. In both the hypo-fractionated and conventionally fractionated regimens, the therapeutic ratio depends not only on the single $\alpha/\beta$ value, but also on the individual $\alpha$ and $\beta$ values. There is a significant therapeutic advantage of grid therapy for treating the studied cervical cancer cells because of their large $\alpha/\beta$ values, and the normal tissue sparing effect for the hypo-fractionation regimen with few fractions is comparable to the conventional fractionation regimen with many fractions. For the radiosensitive normal tissues, both regimens give almost the same results, but for the radio-resistant normal tissue the conventional fractionation regimen is preferred to spare them.