AbstractID: 8541 Title: Measurement and evaluation of inhomogeneity corrections and monitor unit verification for treatment planning

Purpose: Heterogeneous tissue-lung and tissue-bone phantoms have been constructed for the purpose of developing an extended data set of doses measured in different media, particularly at, or near, interfaces. **Method and Materials:** Data have been acquired with Kodak EDR2 film for a Varian 2300cd (6 and 25 MV) and an Elekta Synergy (6, 10 and 18 MV) linear accelerator. These data have been compiled for use in evaluating different planning system calculation algorithms. Ones we reviewed, as examples, included Pinnacle and the correction-based, older version of Eclipse. The data were taken with the intent of exploring the limits in the capabilities of planning systems to handle both energy and small-field effects. As such, data extended from 2x2 to 10x10 cm^2 field sizes over the available range of energies. It is also becoming increasingly important to find some method of checking monitor units generated by these planning systems when heterogeneities are included. To this end, we also evaluated the range of performance accuracy for two, familiar 1-dimensional inhomogeneity correction factors (ICF): a variation on the primary transmission-based effective attenuation method and the TMR ratio method. **Results & Conclusions:** We found, as have others, that Pinnacle predicts doses to, generally, within ±5%, even near interfaces over the full range of energies and field sizes tested. Eclipse (pre-AAA model) Batho and equivalent TAR algorithms were equivalent to, or poorer than the 1-dimensional ICF corrections, particularly with increasing energy and decreasing field size. The effective attenuation and TMR ratio methods were adequate for 6 MV, even for 2x2 fields and appear to have application for 6x6 fields and larger at all energies. In the interest of patient safety, we recommend that some type of corrected backup calculation be done to verify every treatment plan.