AbstractID: 11693 Title: In vivo proton range verification/correction for safe anterior-posterior field treatment of prostate cancer

Purpose: Even with potentially great dose conformality, the Anterior-Posterior (AP) field treatment of prostate cancer is not clinically practiced in proton therapy, due to the sensitive dependence of the depth dose of proton beams on the exact radiological path length of the protons. A method for in vivo range verification was suggested recently based on time-resolved measurement of the dose rate. In this presentation, we explore the applicability of this method to realistic clinical case.
Materials and Methods: The range verification method requires the measurement of time-resolved dose rate functions at all depths to construct a "ruler". When the dose rate function measured in the patient, by a rectal probe, for example, is matched to the "ruler", the radiological path length to the point of measurement is determined. If it is used as a pre-treatment range check, the dose required for the measurement must be negligible. For this reason, we have tested the lower limit of the dose rate in our beam delivery system. We have also investigated and compared the suitability of various types of detectors such as pinpoint ionization chambers and diodes detectors within the clinical limitations. The effect of tissue inhomogeneity on the time-resolved dose rate function has been studied in phantoms.
Results: The dose rate for the relevant beam range can be lowered to less than 1cGy/sec. At this dose rate, certain diode detectors can capture the time variation with reasonable reproducibility. Phantom tests show that tissue inhomogeneity effects may reduce the accuracy of the method, but the effect is limited only to regions near edges.
Conclusion: The time resolved dose monitoring method for beam range verification and correction can be used for prostate treatment by anterior-posterior field.
Conflict of Interest: Project partially supported by Ion Beam Applications, Inc., Belgium.