AbstractID: 12993 Title: Determination of proton beam range by using scintillating fiber optic dosimetry

Purpose: Scintillating fiber type dosimeter was investigated to determine the proton beam range in a short time for the purpose of quality assurance of the patient in the proton therapy. Degradation of output signal in scintillator has to be overcome for applying the scintillating fiber dosimeter on clinical use. One dimensional dosimeter array was tried to measure the range at a time and required characteristics for this application were evaluated. **Methods:** The dosimetry system was composed of commercial scintillating fiber optically coupled with organic based optical fiber. Scintillating light was amplified by photo multiplier tube before being gathered by commercial data acquisition system. Bragg peak and SOBP was measured with scintillating fiber dosimetry. One dimensional scintillating fiber array dosimeter was prepared and Bragg peak and SOBP of proton beam were measured and analyzed. **Results:** The Bragg peak measured by scintillating fiber dosimetry showed degradation of the output signal in high dose region when comparing with the results of the ionization chamber, which is known as quenching effect of scintillator. Quenching effect could corrected by fitting the measured data to quenching equation. However, it didn’t show significant degradation of the signal enough to miss the range within sub-millimeter for the scintillator smaller than the diameter of 0.5 mm. The SOBP curve also showed good agreement with the ionization chamber results after being modified by considering the quenching effect. It can be applied to construct the scintillator array to measure the depth dose distribution at a time. **Conclusions:** Scintillating fiber optic dosimetry was suitable for measuring depth dose distribution of proton therapy beam and determining its range. Quenching effect of scintillator was dealt with well within our tolerable range by fitting method. One dimensional scintillating fiber array provided more applicable and faster way for applying it to clinical field.