

AbstractID: 9397 Title: Measurement of dosimetric Impact of fiducial makers on proton dose distribution

**Purpose:** To achieve accurate patient setup for proton therapy using the physical characteristic, a one of valuable way is to use internal fiducial makers. However our concern is how much the fiducials in fact affect the proton dose distribution in patient. Our purpose in this study is to measure the dosimetric impact of fiducial markers. Our measurement was done using Imaging Plate (IP, Fuji Photo Film Co., Ltd.) instead of films because of its simplicity to use.

**Method and Materials:** IPs were sandwiched between the stacked water equivalent phantoms (Tough Water: WET is 1.026, Kyoto Kagaku ltd.). The makers used were two gold fiducial makers: 0.5 mm diameterx3mm length and 1mm diameter x 3 mm length for each), These are put into a Jelly (water equivalent: 12 HU) in parallel and perpendicular to proton beam axis for each. The jelly layer was sandwiched between phantoms. Right under fiducial layer, a bunch of IP equivalent 5~10 mm thickness was inserted between the phantoms for obtaining high resolution data in depth direction. The dosimetric impacts due to fiducials were measured for 150 MeV and 200MeV focusing especially on in front of and middle of Spread out Bragg Peak (SOBP) 50 mm.

**Results:** For the area proximal from SOBP, there were hot spots over normal proton depth dose (0.5%~20% increase) regardless of marker directions for both energies. Cold spots were also observed both proximal to SOBP (16%~50% decrease) and at middle of SOBP (upto 12%~73% decrease) directly under fiducial placement.

**Conclusion:** We measured and identified the dosimetric impact of fiducials on proton dose distribution using IP. The dose inhomogeneity which occurred right under the fiducial may affect patient absolute proton dose quite significantly.