

AbstractID: 13513 Title: Experimental evaluation of irradiated dose in clinical practice for proton therapy

**Purpose:** The first objective of this study is to experimentally evaluate accuracy and reliability of proton patient-specific dose per monitor unit(DMU) determination method currently used in our institute. The second objective is to explore the possibility of improving the accuracy of the DMU determined as above by using each of the pencil beam algorithm(PBA) and the simple Monte Carlo algorithm(SMCA) in addition to the patient specific measurement. **Material and method:** In order to emulate clinical situations as closely as possible, we used prostate and head and neck phantoms, performing the same procedures as our practice. We planned proton treatments for these phantoms, and determined DMU by patient-specific measurement at the calibration point in polyethylene block(DMU<sub>poly</sub>). Normally, we assume the dose absorbed at this point is approximately the same as the dose absorbed at the reference point in patient. By comparing DMU<sub>poly</sub> with DMU measured at the reference point in phantoms, the error in irradiated dose was estimated. Next, we additionally used each of the PBA and SMCA to include the effect of inhomogeneities in phantoms. The DMU errors remaining even after this correction were examined. **Result:** The dose error of the present method was 1.4% for prostate case, while it was above 3% for 2 out of 6 head and neck cases. For one case, it even amounted to 9.4%. By use of PBA, the error decreased in 3 out of 7 cases. On the other hand, by using the SMCA, the resulting dose error decreased for all but one prostate case, where the error increased only by 0.7%. **Conclusion:** We could show that the SMCA is indeed capable of improving the accuracy of irradiated dose even for the very complex geometry as head and neck cases.