AbstractID: 11573 Title: Feasibility Study of Linac-based IMTMI for Clinical Implementation

Purpose: To investigate the treatment planning feasibility of the linac-based intensity modulated total marrow irradiation (IMTMI) for clinical implementation in patients with hematological malignancies.

Method and Materials: Linac-based IMTMI treatment planning is performed for six patients using Eclipse™ treatment planning system. The planning treatment volume (PTV) consisted of all the bones in the body from head to mid femur except the forearms and hands. Critical organs (OARs) to spare included lungs, heart, liver, kidneys, brain, eyes, oral cavity and bowels and are contoured by a physician on the axial CT images. The three isocenter technique previously developed by our group is employed for the treatment planning in which PTV is divided into three sub-volumes including head&neck, chest and pelvis. IMTMI treatment plans obtained in this study are evaluated using the dose volume histograms (DVH) and by comparing the IMTMI median organ doses with that of conventional TBI. IMTMI planning is difficult for many reasons. To this end, we investigated a common dose volume objective (DVO) set derived from individual DVOs of adult patients to reduce subjectivity in optimization process and also to decrease the optimization time.

Results: Average dose reductions, in comparison to conventional TBI, for critical organs with the linac-based IMTMI technique ranged from 15% for lung to 61% for lenses while more than 95% of the PTV is covered by 99% of the prescribed dose. The use of common DVO method has reduced the optimization time on average by almost 35% making our linac based IMTMI technique clinically feasible to plan within reasonable time.

Conclusion: We demonstrated that clinically superior three isocenter linac-based IMTMI plans, with good PTV coverage and OAR sparing, can be obtained within reasonable time using our common DVO method proposed in this study.

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