

AbstractID: 2473 Title: Analysis of the organ motion effects on the fluences for liver IMRT

Purpose: To study the effects of organ motions due to respiration on the fluences of IMRT plans and to develop an acceptable limit of organ motion for gated IMRT with DMLC delivery.

Method and Materials: The fluence changes due to organ motion were calculated using Chui's algorithm. We limited our studies on the fluence changes from superior-inferior organ motion perpendicular to the motion of MLC. 108 fluence maps of 16 IMRT plans for 8 liver patients were calculated, analyzed, and compared without and with gating. The motion effects on the fluence maps were evaluated by both the fluence differences and the χ function which is a revision of the γ function. The max. displacements of the organ motions of all of these cases were analyzed and correlated with the change of fluences for liver IMRT plans.

Results: The effective fluence due to organ motion of one of the patients was incorporated in dose plan for illustration. The DVH showed that 5 mm of motion displacement with gating seemed to have a little effect on the PTV and normal liver coverage while 9 mm without gating caused 8% drop in D90 and 3% increase in V30 of normal liver. Furthermore, four test cases with various fluence maps were subject to simulated motion with max. displacement ranging from 5 to 25 mm. To keep the $|\chi|$ value >1 percentage for fluence safely below 25% or the percentage of DD $>3\%$ below 40% with or without gating, 8 mm max. displacement seems to be a good cutoff.

Conclusion: After 108 fluence maps of 8 patients and four test cases of different fluence patterns were analyzed, it is concluded that an 8 mm maximum motion displacement seems to be a practical and acceptable standard with gating technique.

Conflict of Interest (only if applicable):

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