THE APPLICATION OF 4D CT IMAGES IN RADIOTHERAPY FOR LUNG TUMORS

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Purpose : The purpose of this study is to describe our management of the respiration-induced uncertainty by the Maximum Intensity Projection (MIP) of 4-dimensional (4D) CT.

Material and Methods : Gross target volumes (GTVs) and planning target volumes (PTVs) were contoured on the images of normal-breathing CT and MIP of 4D CT for 12 patients with primary lung cancer or metastatic lung tumor. The volumes of GTVs and PTVs were compared between the two sets of images by using the paired t-test.

Results : The GTVs of MIP images (mean = 8.13 ± 9.05 cm^3) were larger than those of normal breathing images (mean = 4.74 ± 5.89 cm^3, p = 0.04). When applying different safe margins on GTVs to define their PTVs, the PTVs of MIP images (mean = 25.28 ± 20.38 cm^3) became smaller than those of normal breathing images (mean 75.04 ± 36.49 cm^3, p = <0.01). Moreover, in 3 cases whose tumors were located in the lower lung, the PTVs of normal breathing images could not fully cover the GTVs of the MIP images. On the contrary, for tumors above the carina, the differences of target volumes between the two image sets were smaller.

Discussion and Conclusion : 4D CT depicts the excursion of a lung tumor and increases the accuracy of the target definition. The 4D CT-based plans can reduce the target volumes to spare more normal tissues compared with conventional plans.

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Key words: Lung tumor, Radiotherapy, 4-D CT, Maximum intensity projection (MIP)