Determination of Internal Target Volume Reconstruction Algorithm Beyond the Time Dimension Using Second Model of a 256-Slice CT

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To observing trajectory of moving tumor under free breathing, we compared two image-processing methods and two reconstruction algorithms based on the FDK and adapted to the 256-slice CT. These algorithms were namely 4D image average (4DIA) and 4D image maximum intensity projection (4DIM), 4D projection data average (4DPA) and 4D projection data maximum intensity projection (4DPM). The concept of 4DIA and 4DIM was generated on CT image after backprojection process. 4DIA was averaged each pixel value on the volumetric CT data along the time axis, and 4DIM was selected maximum each pixel value along the time axis. With regard to the 4DPA and 4DPM, these essential concepts are to process projection data along the time axis, rather than reconstructed CT images as 4DIA and 4DIM.

Evaluations of these algorithms were done in the image noise, CT-number accuracy, and target moving distance with various reconstruction time conditions using lung cancer patients and compared these results with those with volumetric cine images. As the results, it is difficult to observe the edge of the tumor in 4DIA and 4DPA images due to decreasing CT number from the original tumor CT number. While 4DIM images emphasized pulmonary vessels as increasing the processing time ranges and it makes difficult to observe the accurate tumor edge. From these results, 4DPM provides the accurate tumor movement and accurate CT-number independent of the reconstruction conditions.