AbstractID: 2103 Title: Physical and clinical evaluations of the image quality: a short scan approach applied to four dimensional CT

We have developed a prototype 256-slice CT-scanner, which employs rotating cone-beam and takes a volume data with one-second scan. In order to reduce effective scan time, Parker[1] proposed half-scan algorithm for utilizing a range up to fan angle $+\pi$, and Taguchi[2] extended half-scan algorithm (new half-scan) for utilizing a larger range up to 2π for cone-beam CT. These weighting functions were applied to projection data and then volume data were reconstructed by Feldkamp algorithm. We examined these algorithms with phantom experiment and clinical performances. As a result, image noises for half-scan and for new half-scan were 40 % and 25 % smaller than that for full-scan. PSF was slightly dependent on the weighting functions. A Feldkamp artifact was observed in disk phantom measurements. New half-scan did not completely eliminate the motion artifact at the fast moving organ such as heart, however reduced it at the slow motion organ such as pulmonary vessels, while half-scan eliminated even the motion artifact at heart. The comparison of the weighting functions showed better performance for half-scan regarding the temporal resolution, however new half-scan was superior to half-scan regarding the image noise and uniformity for approximately 100 mm long along the z-axis.

1. D. L. Parker, ‘‘Optimal short scan convolution reconstruction for fanbeam CT,’’ Med. Phys. 9, 254–257 (1982).

2. K. Taguchi, ‘‘Temporal resolution and the evaluation of candidate algorithms for four-dimensional CT,’’ Med. Phys. 30, 640–650 (2003).