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Image accuracy improvement of interior region of interest (ROI) reconstruction using field modulation CT acquisition

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Region-of-interest (ROI) imaging is considered an effective method to reduce the exposure dose [1]. We propose ROI-based field modulation acquisition (figure 1) to improve image accuracy of inside ROI and restore the information outside of the ROI. In this study, we compared interior image quality of field modulation CT image with conventional interior ROI reconstruction method. A prototype of the CT system (TVX-IL1500H, GERI, Korea), which has a 1016×760 pixel size flat panel detector, was used. The source-to-detector and the source-to-center of rotation distance were 1178 and 905 mm, respectively. Scout view reconstruction method [2] were used as recently presented comparative interior ROI reconstruction. A total of 720 projection data were obtained, from which full view CT reconstructed images were obtained as a reference image using a filtered back projection (FBP). Interior ROI CT images were reconstructed using the 720 truncated projection data. Scout view reconstruction was also conducted with 720 truncated projection data and we corrected the truncation using 6 scout view which were full-size projection data from the previous scan. Proposed field modulation CT image was reconstructed using 714 truncated and 6 full-size projection data at the same time scan. Using field modulation CT imaging, it is possible to obtain exact interior reconstructed image compared with scout view reconstruction [2]. As an additional effect, proposed method can restore the ROI external information of the reconstructed image to be similar to the reference image, when we obtained with using 648 truncated and 72 full-size projection in field modulation CT acquisition system. In conclusion, we have verified the possibility of applying the field modulation acquisition in CT imaging system. In addition, we performed a quantitative evaluation of the proposed field modulation CT image and the image of scout view reconstruction.

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