学位論文審査結果の要旨

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（学位論文審査結果の要旨）

Usefulness of dictionary learning-based processing for improving image quality of sub-millisievert low-dose chest CT: initial experience

【主論文審査結果の要旨】

著者らは論文において下記の内容を述べている。

Purpose:

The aim of this study was to develop a dictionary learning (DL)-based processing technique for improving image quality of sub-millisievert chest computed tomography (CT).

Materials and methods:

Standard-dose and sub-millisievert chest CT were acquired in 12 patients. Dictionaries including standard- and low-dose image patches were generated from the CT datasets. For each patient, DL-based processing was performed for low-dose CT using the dictionaries generated from the remaining 11 patients. This procedure was repeated for all 12 patients. Image noise of sub-millisievert CT with and without DL-based processing was evaluated by measuring standard deviation of CT density within the descending aorta. Image quality of normal thoracic structures on the sub-millisievert CT images with and without DL processing was graded on a 5-point scale (5=excellent, 1=very poor). Lung lesion conspicuity was also assessed on a 5-point scale.

Results:

Image noise on sub-millisievert CT was significantly decreased with DL-based image processing (48.5±13.7 HU vs 20.4±7.9 HU, p=0.0005). Image quality of lung structures was significantly improved with DL-based method (middle level of lung, 2.25 ± 0.75 vs 2.92 ± 0.79,

p=0.0078). Lung lesion conspicuity was also significantly improved with DL-based technique (solid nodules, 3.4±0.6 vs 2.7±0.6, p=0.0273).

Conclusion:

Image quality and lesion conspicuity on sub-millisievert chest CT images can be significantly improved by DL-based post-processing utilizing dictionary pairs of standard- and low-dose chest CT. The proposed technique may facilitate the use of sub-millisievert CT for lung cancer screening.

以上、本論文は辞書学習型画像処理法が超低線量胸部 CT の画質を改善し、病変視認性の向上に寄与しうることを示した論文であり、学術上極めて有益であり、学位論文として価値あるものと認めた。

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