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Data Article

Visualization of simulated small vessels on computed tomography using a model-based iterative reconstruction technique

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ABSTRACT

This article describes a quantitative evaluation of visualizing small vessels using several image reconstruction methods in computed tomography. Simulated vessels with diameters of 1–6 mm made by 3D printer was scanned using 320-row detector computed tomography (CT). Hybrid iterative reconstruction (hybrid IR) and model-based iterative reconstruction (MBIR) were performed for the image reconstruction.

Specifications Table *[please fill in right-hand column of the table below]*

Subject area	Radiology
More specific subject area	Effect of Image reconstruction methods for small blood vessels in CT.
Type of data	Image, graph, text

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How data was acquired	Phantom with simulated small vessels was scanned with CT, and it was reconstructed by hybrid IR and MBIR.
Data format	Raw, Analyzed
Experimental factors	The sharpness of the blood vessel boundary was measured with a quantitative index.
Experimental features	Radiation dose was determined by the routinely used noise level in coronary CT angiography. Adaptive Iterative Dose Reduction 3D (AIDR 3D) was used as the hybrid IR, Forward-projected model-based Iterative Reconstruction Solu-Tion (FIRST) was used as the MBIR.
Data source location	1-2-3 Kasumi, Minami-ku, Hiroshima, 34° 22′ 44.4″ N; 132° 28′ 38.26″ E
Data accessibility	The data are available with this article

Value of the data

- The data has described the effect of MBIR for visualizing small vessels in CT images.
- Researchers can recognize the difference in the appearance of small vessels in various reconstruction method.
- Also researchers can recognize the difference in the appearance of small vessels in various diameters.
- This data shows the superiority of MBIR for visualization of small vessels.

1. Experimental design, materials and methods

1.1. Vessel phantom

The vessel phantom (outer diameter 80 mm) was made by a 3D printer (Agilista 3100, KEYENCE, Osaka, Japan) and included cylinders that simulated 1-, 2-, 3-, 4-, 5-, and 6-mm vessels (Fig. 1). The aorta was simulated by a 30-mm diameter cylinder at the center of the phantom. The cylinders were filled with diluted iodine contrast material (Iohexol, Daiichi-Sankyo, Tokyo, Japan, concentration 13 mgI/ml) to simulate the vascular space.

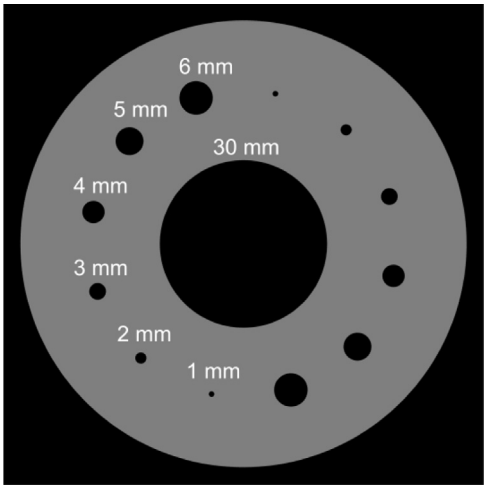

Fig. 1. Design of our vessel phantom. The cylinders measuring 1–6 mm in diameter simulate small vessels. The 30-mm diameter cylinder in the center simulates the ascending aorta.