AbstractID: 7228 Title: A Technical Solution to Avoid Partial Scan Artifacts in Myocardial Perfusion Imaging using MDCT

Purpose: Partial scan reconstruction methods improve temporal resolution but cause large CT number fluctuations in MDCT systems. The purpose of this study was to assess the feasibility of a new approach to solve this problem.

Method and Materials: An anthropomorphic cardiac phantom was scanned on a dual-source CT scanner (Siemens Definition) using several perfusion modes both with and without ECG-gating. An additional ECG-gated acquisition was conducted using the ECG-signal synchronized with the gantry rotation. The central insert of the cardiac phantom was replaced with a water-filled tank containing a syringe filled with different iodine solutions (500, 1000, 1500 and 2000 HU). Images were reconstructed using both full (360°, 330 ms) and partial (180° + fan angle, 83 ms) approaches. A ring ROI was placed outside the syringe concentrically with the iodine circle and the mean CT number fluctuations were plotted vs. time. In addition, in-*vivo* animal data were acquired using the regular perfusion mode and the mode when the pig's ECG was synchronized with the gantry rotation. A simple x-ray detector was used to generate a so-called 'once-around' signal for every gantry rotation. This signal was then modified and used to pace the pig's heart.

Results: When the ECG signal was synchronized with the gantry rotation, the same cardiac phase always corresponded to the same x-ray tube positions and, hence, the same scattering geometry. As a result, the range in the CT number fluctuations was reduced from 20 HU for the regular perfusion mode down to only 3 HU for the synchronized mode.

Conclusion: The new approach for myocardial CT perfusion based on synchronizing the ECG signal with the x-ray tube position significantly improves the quality of the perfusion data by reducing the CT number fluctuations.

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