

AbstractID: 10867 Title: Full-scan versus half-scan in cone beam breast CT - a quantitative comparison

Purpose:

To evaluate and compare half-scan and full scan techniques for cone beam breast CT in terms of CT number, radiation dose distribution and CNR.

Method and Materials:

CT number comparison: A 11 cm diameter breast phantom, made of a stack of glandular and fat tissue, was analytically modeled to evaluate the difference of CT numbers reconstructed from Feldkamp algorithm based half and full scan reconstruction.

Radiation dose distribution: An 11 cm diameter cylindrical breast model was constructed to evaluate the dose distribution with Geant4 based Monte Carlo simulation.

CNR evaluation: An 11 cm diameter polycarbonate cylinder was imaged to simulate breast imaging. Five holes of the same size (5 mm in diameter) were drilled at different radial distance from the phantom center. The phantom, filled with iodine solution, was imaged with an aSi/CsI flat panel detector based cone beam CT scanner. Iodine CNRs were measured for different half-scan coverage selection.

Results:

It has been found that the CT numbers reconstructed from half-scan were close to those from full-scan. The radiation doses in the half-scan coverage can be twice than those out the coverage as the radial distance increasing. The CNRs for different half-scan coverage were approximately identical.

Conclusion:

Our results show that the reconstructed data from half-scan are comparable to that from full-scan. The radiation doses are low for the positions out the half-scan coverage. The CNRs vary little with half-scan coverage.

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