

AbstractID: 3403 Title: Accuracy in the determination of microcalcification thickness in digital mammography

Purpose: To study the factors which affect the accuracy of the microcalcification (MC) thickness determination in digital mammography, in particular, the contribution from scattered radiation.

Method and materials: The effect of scattered radiation on the accuracy of a MC thickness reconstruction has been studied using simulation. The GEANT4 code, assuming a scanning beam geometry, has been used to simulate photon transport through a tissue-like flat phantom containing 0.2-1.0 mm thick cylindrical MC and a pixelized detector (100 microns side). The influence of detector resolution has been analyzed by the simulation of small spherical MC embedded into the phantom. Background has been determined by a fitting technique for the signal/background description, using a Gaussian-like expression for the first, and a polynomial for the second. Measurements were carried out using a GE Senographe 2000D unit.

Results: Our results indicate the possibility of reconstructing the MC thickness with accuracy of the order of 12.5%, including background, position and simulation uncertainties, when a 3 mm wide beam is used. The transversal size reconstruction for cylindrical MC having diameters larger than 1 mm, is of the order of 5%. Thickness reconstruction is found to be an alternative to signal to noise ratio for microcalcification detection.

Conclusions: These simulations indicate that the thickness of dense objects larger than about 150 microns can be reconstructed using a digital mammography unit having 100 micron pixels and exposures equivalent to 1.5 mGy mean glandular dose.