AbstractID: 10606 Title: Detection of simulated microcalcifications: effect of random and anatomic noises in digital mammograms

Purpose:
To assess the influence of quantum and anatomic noises on the detection of simulated microcalcifications (MCs) on digital mammograms.

Materials and Methods:
Images of an anthropomorphic breast phantom (RMI 169) overlapping with simulated MCs ranging from 160 to 224 micron in size placed at various locations were acquired with an aSi/aSe flat panel based digital mammography system (Selenia) operated with Mo-Mo target/filter combination at 28 kVp. These mammograms were exposed with 10, 20, 40, 80, 160, and 325 mAs. All images were displayed randomly on a review workstation and reviewed by five readers independently. The readers were asked to count the number of visible MCs. The ratio of visible MCs was computed for each different combination of MC size, reader and mAs setting. The performance differences in the ratios averaged from all readers between mAs levels was assessed by performing Student t-test to compute the p values.

Results:
It was found that in the dense tissue region the visibility reached 90% at 10, 33 and 37 mAs for 200-212, 160-180 and 180-200 micron MCs, respectively; and at 10 mAs for 180-200 and 200-212 micron MCs and at 15 mAs for 160-180 micron MCs in the fatty region. The lower visibility in the dense tissue region may be due to the fact that the photon flux was lower in the dense tissue regions therefore requiring higher mAs setting to achieve sufficient image SNRs for detection of MCs. Our results also show that in the dense tissue region, the visibility of 180-200 micron MCs stayed at 90% at 80 mAs. This may indicate that the anatomical noise was limiting the detectability of 180-200 micron MCs.

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