

AbstractID: 2945 Title: Comparison of radiation dose using full field digital and conventional screen-film mammography in a screening clinic

Purpose: To evaluate radiation doses delivered by an amorphous selenium based full-field digital mammography (FFDM) system, and to determine if the expected reduction in average glandular dose (AGD) resulting from the increased efficiency of the digital detector is realized in clinical practice. A secondary purpose was to determine clinical exposure parameters for digital mammography that maintain a level of image noise consistent with screen/film mammography.

Method and Materials: Phantom material that approximates breast tissue (50% adipose, 50% glandular) was used for direct comparison of dose between the two clinical mammography units, one digital and one conventional. The mammographic view, compressed breast thickness, kilovoltage, milliampere-second product, and K-edge filter were recorded for images of randomly-selected patients examined on each machine. Entrance skin exposure was calculated from measurements, and AGD was estimated using normalized exposure-to-dose conversion factors that assume 50% adipose and 50% glandular breast composition. A two-tailed student t-test was used to compare the patient doses.

Results: No difference was observed in the mean AGD delivered by the two mammography units over a wide range of compressed breast thicknesses and compositions. For compressed breast thickness above 7 cm, the dose was significantly lower for the FFDM unit ($P < 0.05$) due to the use of higher kilovoltage and rhodium filtration, and correspondingly lower values of mAs.

Conclusion: The exposure parameter selection algorithm employed by the FFDM unit does not reduce dose compared with a conventional mammography unit for a wide range of breast thicknesses. Users wishing to reduce AGD should consider using manual techniques, and developing technique charts to achieve the desired compromise between dose and image quality. The algorithm used by the conventional mammography unit to automatically select kVp resulted in extended exposure times and unnecessarily high values of mAs and AGD because of its relatively low upper bound on kVp.