AbstractID: 7011 Title: Simulation of tomosynthesis mammograms with cone beam CT images of mastectomy breast specimens.

Purpose: To describe and discuss about a technique to simulate digital mammograms and tomosynthesis images with cone beam CT images of mastectomy breast specimens.

Method and Materials:
To allow x-ray images to be simulated, cone beam breast CT images of a mastectomy breast specimen were acquired at 80 kVp and used to generate a 3-D map of linear attenuation coefficients for mammographic x-rays. The map was then deformed to generate a new map for a compressed breast. A software re-projector was developed and used to compute projection images for a stationary detector and a linearly shifted x-ray source. A special re-projector was developed to preserve the contrast of microcalcifications (MCs). The resulting images were then used to reconstruct tomosynthesis mammograms using various reconstruction algorithms.

Results: We have successively used cone beam CT images of mastectomy breast specimens to generate 3-D maps of attenuation coefficients to model compressed breasts and to use them to simulate digital mammograms and tomosynthesis images. It was found that MCs clearly visible in cone beam CT images were not visible in regular mammograms but faintly visible in tomosynthesis images. The MCs were clearly visible in both MC enhanced mammograms and the tomosynthesis images reconstructed from them.

Conclusions:
Cone beam CT images may be used to model a compressed breast for simulating mammograms and tomosynthesis images. Cone beam CT images are superior to regular or tomosynthesis mammograms in depicting MCs within their resolution limit. MC enhanced re-projection, however, could be useful in displaying the cone beam CT images with the more conventional appearances of regular and tomosynthesis mammograms while maintaining the contrast and visibility of MCs in the CT images.

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