

AbstractID: 10381 Title: Comparison of dedicated cone-beam breast CT with conventional CT for detection of micro-calcification

Purpose: To compare the visibility of micro-calcifications in cone-beam breast CT with that in conventional CT

Material and method: Calcium Carbonate grains (ranging from 180-200 to 250-280 microns) were used to simulate calcifications. Two bowl shaped plastic containers filled with paraffin were used to simulate a breast. The phantom was scanned with a bench-top experimental CBCT system, configured for breast imaging. The system consists of a conventional tungsten target x-ray tube (G-1592) and an a-Si:H/CsI flat panel detector (Paxscan 4030CB). The source to image and source to iso-center distances are 100 and 75 cm, corresponding to a magnification factor of 1.33 at the iso-center. A conventional CT system (GE Discovery STE PET/CT Scanner) was used to scan one phantom by itself and with two phantoms on an anthropomorphic chest phantom.

Result: The visibility of the calcifications in CBCT images was found to be significantly better than that in the conventional CT images. Calcifications as small as 180-200 $\mu$ m were visible in the CBCT images. While calcifications of 212-224 $\mu$ m were visible in the conventional CT images when only breast phantom was scanned. None of the calcifications studied (280  $\mu$ m or smaller) were visible when the two breast phantoms were placed on the anthropomorphic chest phantom for scan.

Conclusion: Our results indicated that CBCT is capable of imaging calcifications as small as 180  $\mu$ m. This is due to the intrinsic high spatial resolution of the detector used and the pendant geometry used which allowed the breast to be scanned and imaged by itself. The conventional CT is intrinsically lower in spatial resolution. An important disadvantage is the inclusion of the entire chest in the scan which results in degraded spatial resolution as well as overall higher radiation dose to the patient.