

**Purpose:** Conventional mammography (CM) is the most effective tool for the early detection of breast cancer currently available. However, the sensitivity to detect small breast cancers and the specificity of CM remain limited owing to an overlap in the appearances of lesions and surrounding structure. We propose to address the limitations accompanying CM using flat panel detector(FPD)-based cone beam volume CT breast imaging (CBVCTBI) technique. In this study, we perform a phantom experiment to determine the feasibility of using CBVCTBI for breast cancer detection.

**Methods and Materials:** The CBVCTBI prototype consists of a GE 8800 CT gantry, an x-ray tube, an 30x40cm Dpix FPD mounted on the gantry, a CT table and a PC. An average size breast phantom for CBVCTBI consists of 10 cm body cylinder with 12 cm height and three inserts. With a single scan, 360 projections over 360 degrees were acquired for all phantom scans and direct 3D reconstructions were obtained to evaluate the system for CBVCTBI applications. To perform a comparison study with CM, we use a 4.5 cm compressed phantom with the same inserts and a Lorad M III system with a CM x-ray technique.

**Results:** The results demonstrate that the CBVCTBI system can detect a few millimeter simulated carcinoma and 0.2 mm calcification for an average size breast with the total radiation dose less than or equal to that of a single screening CM exam.

**Conclusion:** This research work demonstrates that a FPD-based CBVCTBI is a potentially powerful breast imaging tool.