AbstractID: 5953 Title: Computed tomography of the breast: Design, fabrication, characterization, and initial clinical testing

Purpose: Although there is overwhelming evidence that mammographic screening has led to a reduction in breast cancer mortality, most breast imaging experts agree that screening technology could be improved. We have developed a dedicated breast CT scanner which may be appropriate for breast cancer screening in some groups of women. Methods and Materials: A breast CT scanner was designed and fabricated in our laboratory using off-the-shelf components (an x-ray system, flat panel detector, and motor) and custom-manufactured parts. Image quality was assessed subjectively in terms of artifacts, and by conventional metrics (MTF for spatial resolution, RMS noise, etc.). Radiation dose levels were adjusted to be comparable to two-view mammography, using a series of physical measurements and Monte Carlo computations. Evaluation in patients has begun with both Phase I and Phase II clinical trials. Results: The spatial resolution of the bCT system exceeds that of commercial scanners, with a 10 percent MTF corresponding to XX inverse mm (center of field, 80 kVp, 500 views). Noise metrics demonstrates that the scanner performs in a quantum limited manner. Ten healthy volunteers have been scanned, and as of this writing 35 women with BIRADS 4 or 5 diagnoses have been scanned. Subjective evaluation of image quality clearly indicates detail not seen mammographically. The volume dataset (300 512 x 512 pixel images) can be displayed in coronal, axial, saggital or any arbitrary view angle. Conclusions: The clinical evaluation of the bCT system is underway, and early subjective results have generated interesting images with excellent anatomical depiction. The use of contrast agents has added a functional component to breast CT imaging. Further patient accrual with subsequent quantitative (ROC) analysis is needed.

Learning Objectives: Status of breast CT implementation at UC Davis