Purpose: To test the hypothesis that the mean skin thickness determined using cone-beam dedicated breast CT varied between breasts with malignant, hyperplasia and benign pathology, and to determine the appropriate skin thickness for Monte Carlo based estimation of normalized glandular dose coefficients.

Methods: Breast skin thickness was estimated in 137 women scheduled for biopsy (BI-RADS 4 or 5), who underwent unilateral cone-beam dedicated CT of the breast to be biopsied, after providing written informed consent and in adherence to an IRB-approved protocol. Pathology results were available for 132 women and there were 38 malignancies. A previously reported method [Huang et al., Med Phys 35(4):1199-206, 2008] was applied to coronal (transverse) images reconstructed to 0.273 mm voxel size. The accuracy of the method was determined by imaging two phantoms of differing wall thickness and shape. For each breast, the mean, intra-breast standard deviation (SD) and the median skin thickness were computed. The mean skin thickness and associated confidence intervals (CI) in our study population were obtained from the mean skin thickness of each breast.

Results: The estimated mean wall thicknesses for both phantoms were within +/-1% of the measured thickness. At the 0.05 level (ANOVA), the skin thickness means did not vary significantly with pathology (p=0.61). For each breast, the median, mean and intra-breast SD, in mm, were in the range [0.87,2.23], [0.87,2.34], and [0.22,0.85], respectively. From all 137 women, the mean +/- inter-breast SD and 95% CI were 1.44+/-0.25 and [1.40,1.48], respectively.

Conclusions: The skin thickness means were not different between breasts with malignant and non-malignant pathology. Our estimate of mean skin thickness is in agreement with a previous report. Skin thickness of approximately 1.45 mm, rather than the standard 4 mm [Wu et al., Radiology 193:83-9, 1994], is appropriate for Monte Carlo based determination of normalized glandular dose coefficients.

Funding Support, Disclosures, and Conflict of Interest:

Supported in part by the National Institutes of Health (NIH) grants R01 CA128906 and R21 CA134129. The contents are solely the responsibility of the authors and do not represent the official views of the NIH or NCI.