

VOLUMETRIC BREAST DENSITY AND BREAST CANCER RISK FROM DIGITAL MAMMOGRAMS – PRELIMINARY RESULTS

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Background: The association between fractional area of breast density as measured from film mammograms and breast cancer risk is well established. The environment of breast imaging has evolved in the past five years in that much of mammography is now performed digitally. As well, it has been suggested that volumetric measures of breast density might be expected to provide stronger risk prediction than area measures. We have been studying how best to measure mammographic density from digital mammograms and comparing volumetric, area and hybrid measurements in terms of their ability to convey information on risk.

Methods: We used two algorithms, Cumulus V, (developed in house) and Volpara (Matakina Technology) to measure volumetric density in digital mammograms acquired in a single institution on a GE Essential system (GE Healthcare, Chalfont St Giles, UK). Mammograms including 219 cancers were matched by age to images in a bank of 939 controls and relative risk was calculated between the highest and lowest octiles of density. Most of the epidemiological studies involving breast density have used fractional density by area rather than by volume. Therefore, we have also created a hybrid method which uses the fractional volumetric density in each image pixel to compute a measure of fractional density by area. This has two advantages: 1) it can be done fully automatically and, therefore, is objective and reproducible and 2) it includes data in the peripheral regions of the breast, that are often missed in thresholding methods in the measurement.

Results: For volumetric density the relative risk was 2.8 ± 0.6 for the Cumulus V algorithm and 2.7 ± 0.8 for Volpara. Tested on the same set of images the hybrid method yielded a relative risk between highest and lowest octiles of 3.4 ± 1.1 .

Conclusions: The two volumetric approaches provide similar relative risks, however, it is planned to evaluate the methods on a larger data set. The results obtained using the hybrid “volume-to-area” method suggest that that further study of this approach is worthwhile.

ABSTRACTS FOR SPEAKERS