


Breast Cancer Risk Assessment using Texture & Shape Analysis of Mammograms (Clinical perspective)



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Background

- Breast cancer is the leading causes of cancer mortality among females.
- Mammography is the single most effective method of screening for breast cancer and data indicates that the earlier breast cancer is found, the better the chances of survival.
- Mammographic density is a strong risk factor for breast cancer. However, whether changes in mammographic density due to Hormone Replacement Therapy (HRT) are associated with risk remains unclear.

Approach and Methods

- Investigate the utility of computer based automated approaches to the assessment of breast density, heterogeneity measures and evaluate to which Degree these measures indicate an elevation of breast cancer risk.
- Investigate if these measures changes with the treatment like HRT eg. Estrogen + Progesterone (E+P), Estaradiol, Raloxefene taken in a different ways (nasally, orally, transdermal) on time series mammography study (quantitative comparison of temporal mammograms).
- Standardize and calibrate these indicative measures from radiologist grading eg BIRADS, percentage density, and biochemical markers.
- Discover the association of different biochemical markers with breast cancer risk and bone related disease.

Results

- Automatic scoring of mammographic pattern is more indicative of estrogen + progestogen treatment than breast density analyses performed by radiologist.
- In the oral HRT trial, active treatment induced significant increase in breast density, In contrast,

None of the methods detected significant changes in women receiving nasal HRT.

- Local pattern scoring of mammograms is a strong and independent predictor of breast cancer.
- Low dose transdermal estradiol induces breast density and heterogeneity changes comparable to those of raloxifene

Conclusions

- We showed that pulsatile hormone therapy via the nasal administration route provided relative advantages in terms of breast safety compared with the apparent adverse effects of oral hormone therapy.
- We showed that estradiol induces changes not only of the mammographic density, but also in the patterns.
- We demonstrated that percentage density is more indicative of breast cancer risk than BI-RADS.

Key Publications

- M. Nielsen et al, "Breast density changes associated with postmenopausal hormone replacement therapy: post hoc radiologist- and computer-based analyses", In press, Int. Menopause Journal, 2010
- M. Nielsen et al "Low dose transdermal estradiol induces breast density and heterogeneity changes comparable to those of raloxifene", Menopause Journal, August 2009 Volume 16 - Issue 4 - pp 785-791, 2009
- J. Raundahl, M. Loog, and M. Nielsen, "Mammographic density measured as changes in tissue structure caused by HRT," in Medical Imaging 2006: Image Processing, J. M. Reinhardt and J. P. W. Pluim, Eds., vol. 6144, pp.141-148,2006