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Breast cancer detection using sonography in women with mammographically dense breasts

Jimmy Okello[1], **Harriet Kisembo**[1], **Sam Bugeza**[1] and **Moses Galukande**[2]
[1]Mulago National Referral and University Teaching Hospital, Uganda
[2]Makerere University, Uganda

Background: Mammography, the gold standard for breast cancer screening misses some cancers, especially in women with dense breasts. Breast ultrasonography as a supplementary imaging tool for further evaluation of symptomatic women with mammographically dense breasts may improve the detection of mass lesions otherwise missed at mammography. The purpose of this study was to determine the incremental breast cancer detection rate using US scanning in symptomatic women with mammographically dense breasts in a resource poor environment.

Methods: Women referred for mammography underwent bilateral breast ultrasound, and mammography for symptom evaluation. The lesions seen by both modalities were described using sonographic BI-RADS lexicon and categorized. Ultrasound guided core biopsies were performed. IRB approval was obtained and all participants provided informed written consent.

Results: In total 148 women with mammographically dense breasts were recruited over six months. The prevalence of breast cancer in symptomatic women with mammographically dense breasts was 22/148 (15%). Mammography detected 16/22 (73%) of these cases and missed 6/22 (27%). The six breast cancer cases missed were correctly diagnosed on breast ultrasonography. Sonographic features typical of breast malignancy were irregular shape, non-parallel orientation, non circumscribed margin, echogenic halo, and increased lesion vascularity (p values <0.005). Typical sono-features of benign mass lesions were: oval shape, parallel orientation and circumscribed margin (p values <0.005).

Conclusion: Breast ultrasound scan as a supplementary imaging tool detected 27% more malignant mass lesions otherwise missed by mammography among these symptomatic women with mammographically dense breasts. We recommend that ultra sound scanning in routine evaluation of symptomatic women with mammographically dense breasts.

okellojimmy@hotmail.co.uk

Biofunctionalized carbon nanotubes platform for biomedical application

K Kamil Reza[1], **Saurabh Srivastava**[1,2], **Surendra K Yadav**[1] and **A M Biradar**[1]
[1]National Physical Laboratory, India
[2]Banaras Hindu University, India

We have fabricated the chemically functionalized multi-walled carbon nanotubes (MWCNT) electrophoretically deposited onto indium tin oxide for urea detection. Urease and glutamate dehydrogenase are attached to MWCNT/ITO electrode surface covalently using ethyl-dimethy laminopropyl-carbodiimide and N-hydroxysuccinimide coupling chemistry. Excellent electrochemical properties of MWCNT and covalent functionalization of dual enzyme improve biosensor stability and sensitivity. The electrochemical response studies of the proposed biosensor exhibits wide detection range (0.83-24.9 mM), low detection limit (1.3 mM) and higher sensitivity of 4.67 μ AmM-1cm-2. The low magnitude (0.274 mM) of the apparent Michaelis-Menten constant (Km) value indicates high enzymatic affinity of Urs-GLDH enzymes to MWCNT/ITO electrode surface.

kamilreza@gmail.com

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