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Positron emission tomography imaging in breast cancer: a pictorial essay

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Learning Objective: We offer a pictorial essay illustrating the clinical applications of Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography (FDG PET/CT) imaging in the staging and response assessment of breast cancer.

Background: Imaging plays a key role in the diagnosis and management of Breast Cancer. Commonly, this involves Mammography for diagnosis, followed by Computed Tomography and Scintigraphic Bone Scan for staging and monitoring.

The advent of FDG PET imaging has revolutionised the practice of oncologic imaging by conferring the additional dimension of metabolic imaging to the precision of structural imaging achieved by modern day modalities of Computed Tomography and Magnetic Resonance Imaging scans.

Its use has rapidly expanded, especially so in the field of oncology, where whole body imaging for the purposes of diagnosis, staging and monitoring is essential in management. High spatial resolution and superior sensitivity and specificity when combined with CT imaging makes it an invaluable tool in clinical practice.

Details: We present a series of images on the use of FDG PET/CT hybrid imaging in the staging of patients with histologically proven breast carcinoma, based on the AJCC TNM classification criteria for breast cancer, as well as the use of FDG PET/CT in post therapy assessment.

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POSTER SESSION

Screening

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Does full-field digital mammography in a decentralized breast cancer screening program lead to comparable screening performance parameters as film-screen mammography?

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Background: Several studies confirmed that screening with full-field digital mammography (FFDM) is not inferior to film-screen mammography (FSM). Most of these studies have been performed in a centralized screening organization. However, in some countries a decentralized organization is used. In a decentralized organization, the first reading takes place in the local unit while the second reading can be organized in a central breast unit (CBU). The purpose of this study is to compare the screening performance parameters of FFDM with the parameters of FSM in the framework of a decentralized national screening organization.

Materials and Methods: A nationwide decentralized screening program was launched in 2001 and since April 2005 screening with FFDM has been allowed. The program offers a biennial mammography screening to women aged between 50 and 69 years. The national quality assurance manual for the physical-technical evaluation strictly adheres to the European Guidelines. Firstly, the screening performance parameters of the three regional-screening-units (RSUs) that first switched to FFDM (11,355 women) were compared to the parameters of the FSM period of the same three RSUs (23,325 women). Secondly, they were compared to the screening performance parameters of the whole central breast unit, including 147,690 women.

Results: For the first control group: the Recall Rate (RR) of the FFDM group in the initial round was 2.64% (for FSM 2.40% ($p = 0.43$)) and the subsequent round 1.20% (for FSM 1.58% ($p = 0.03$)). The overall Cancer Detection Rate (CDR) was 0.59% for FFDM and 0.64% for the FSM group ($p = 0.56$), which corresponds to 0.63% in the initial round and 0.57% in the subsequent round for the FFDM group and 0.60% in the initial round and 0.72% in the subsequent round for the FSM group. The percentage of Ductal Carcinoma in Situ (DCIS) was 0.07% in the FFDM group and 0.16% in the FSM group ($p = 0.02$). The Positive Predictive Value (PPV) was 34.9% in the FFDM group and 30.67% in the FSM group ($p = 0.09$), with a high PPV in the subsequent round (48.00% for FFDM vs. 45.93% for FSM) and lower in het initial round (24.05% for FFDM vs. 24.86% for FSM).

Comparing the results of FFDM with the whole CBU (second control group): the RR of the CBU in the initial round was 2.75% ($p = 0.70$) and in the subsequent round 1.14% ($p = 0.66$); the CDR of the CBU in the initial round was 0.69% ($p = 0.68$) and in the subsequent round 0.47% ($p = 0.19$); the PPV in the initial round was 25.29% ($p = 0.80$) and in the subsequent round 41.29% ($p = 0.18$). Over the period 2001 to 2008, DCIS varied between 0.8/1000 and 1.8/1000 in the inital round and 0.6/1000 and 1.1/1000 in the subsequent round.

Conclusion: This is the first report on a decentralized screening organization where FFDM is implemented successfully with a high CDR and without an increase of RR.

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Mammography screening and radiation-induced breast cancer among women with a familial or genetic predisposition: a meta-analysis

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Background: Women with familial or genetic aggregation of breast cancer are often offered breast cancer screening outside the population screening program, due to their high breast cancer risk and possibly young age of onset. However, the benefit of early tumour detection by mammography screening could be reduced by the risk of radiation-induced tumours. A meta-analysis on epidemiological studies was conducted and addressed the question how low-dose radiation exposure, such as mammography screening and chest x-rays, affects breast cancer risk among high-risk women.

Materials and Methods: A systematic search was conducted in Pubmed and EMBASE/Medline. The search strategy "Breast neoplasms AND Mass screening/adverse effects OR Mammography/adverse effects OR neoplasms, radiation-induced" was combined with text words focusing on high-risk women. Pooled odds ratios (OR) were calculated.

Results: In total, 104 articles were found, of which 53 were relevant for screening by two independent reviewers. Finally, 6 studies were selected. Four studies examined the effect of exposure to low-dose radiation among mutation carriers. Two studies researched the effect of radiation among women with a family history of breast cancer. Pooled OR revealed an increased risk of breast cancer among high-risk women due to low-dose radiation exposure (OR = 1.5, 95% CI: 0.9−2.4). Exposure before the age of 20 (OR = 2.5, 95% CI: 1.9−3.2) or five or more exposures were associated with a significantly higher radiation-induced breast cancer risk (OR = 2.5, 95% CI: 1.6−3.9).

Conclusion: Low-dose radiation increases breast cancer risk among young women with a familial or genetic predisposition. A careful approach is advised when using low-dose radiation among high-risk women, and repeated exposures and exposure at young age should be avoided.

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Barriers affecting uptake of breast cancer screening in women of rural India and their impact on the disease: experience from the breast cancer screening services of a teaching hospital

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Background: In developing countries like India majority of rural population is deprived of availability of health resources and awareness programmes. This study was conducted to prospectively evaluate factors which act as barriers to uptake of breast screening in rural north Indian women and to study its impact on clinical consequence of the disease. It was also conducted to provide an insight to the health planners into devising targeted strategies.

Patients and Methods: Non compliant/deprived rural areas were identified. Regular community based educational programmes were conducted (2006–2009) which included distribution of multilingual information pamphlets and literature, invitation from the doctor for free screening with free transportation facilities and viewing of well illustrated screening audiovisuals. Every round was followed by filling of multilingual questionnaires to know the perceptions of screening practices of females by social workers trained according to ethnic and sociocultural beliefs of the targeted population.