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Diagnostic Multidisciplinary Meeting in a Breast Cancer Center – Is It Worth It?

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Introduction: A multidisciplinary assessment of breast morphological changes, combining clinical evaluation with imaging and pathology, is essential in establishing a correct and timely diagnosis. The aim of this review is to assess the accuracy of the decisions taken at the diagnostic multidisciplinary meeting (DMDM) during a six month period.

Materials and Methods: Retrospective analysis of prospectively collected data of all patients discussed at the DMDM between 1/10/2010 and 3/31/2011. We analyzed demographic, clinical and radiological characteristics of the lesions, as well as the decisions taken and the final outcome. The results were evaluated in terms of malignancy (positive=malignant, negative=benign). Patients who were discharged from the breast unit were considered to maintain unchanged lesions.

Results: We evaluated 273 patients, of whom 271 (99.3%) were female; the median age was 48 years (range: 19–91). 64% of patients were evaluated for a palpable nodule. Concerning the results obtained by cytology or by histology before the evaluation in the DMDM, 62.3% (n = 170) were considered benign, 33.3% (n=91) malignant and the remaining undetermined. In 42.1% of cases (n=115) the MDM proposed surgical excision and in 54.2% of cases (n=148) surveillance and clinical imaging of the lesion. In most cases (96.3%) the patient accepted the treatment plan, but in two cases the treatment plan was not met. It was not possible to assess the results of the DMDM decision regarding six of the evaluated cases. Of the remaining 267, there were no false negative results and there was only one false positive (0.4%). The decision taken by the DMDM meets a sensitivity of 100%, a negative predictive value of 100%, a specificity of 99.4%, a positive predictive value of 98.9% and an accuracy of 99.6%.

Conclusion: Our results validate the multidisciplinary decision-making process, in order to minimize the errors in the diagnosis of breast lesions.

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Is Repeating of the Contralateral Mammogram of Referred Patients From Breast Cancer Screening with Unilateral Suspicion of Malignancy Still Necessary? a Retrospective Study.

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Background: The Netherlands have a nationwide breast cancer screening program. Screening mammograms consist of bilateral two-view images of the breast. If indicated, patients are referred to a specialized breast center for further analysis, where mammograms are repeated bilaterally. Since the screening is digitalized, repeating of at least the mammogram of the non suspicious side seems unnecessary.

The aim of this study is to determine the additional value of repeating the contralateral mammogram.

Material and Methods: 395 patients were referred from the breast screening program to the Maastricht University Medical Center (MUMC) between October 2009 and August 2011 with unilateral suspicion of malignancy. In all patients a bilateral mammogram was repeated and analyzed by a dedicated breast-radiologist. If biopsy showed breast cancer, a breast MRI was performed for preoperative staging, according to the European Society of Breast Imaging (EUSOBI) guidelines.

A database of all these patients, with their radiology and pathology results, was made.

Results: Of the 395 patients, referred for unilateral suspicion of malignancy, 150 patients were diagnosed with malignancy on the referred side. In 5 patients a malignant lesion in the contralateral side was found as well (1.5%; patient 1–5). In 1 patient no malignancy was found on the referred side, though on the contralateral side a malignancy was diagnosed (0.3%; patient 6). Three of these 6 malignancies were detected with the repeat mammogram (50%; patient 2–4). The remaining 3 malignancies were diagnosed by preoperative breast MRI, just as the first three malignancies (100%; patient 1–6). In patient number five a breast MRI was made, although no malignancy was found with the mammogram, because the patient insisted to get a breast MRI.

Conclusion: Because preoperative breast MRI is standard care, according to the EUSOBI guidelines, in the preoperative staging in breast

cancer patients, repeating of the contralateral mammogram in referred patients with unilateral suspicion of malignancy, is not necessary.

Patient	MUMC mammogram		Breast MRI		Pathology	
	CM	RS	RS	NRS	RS	NRS
1	+	–	+	+	IDC (Ø1.5 cm)	IDC (Ø1.4 cm)
2	+	+	+	+	IDC (Ø1.1 cm)	IDC (Ø1.6 cm)
3	+	+	+	+	IDC (Ø1.9 cm)	DCIS (Ø2.3 cm)
4	+	+	+	+	IDC (Ø1.8 cm)	IDC (Ø1.0 cm)
5	–	–	+	+	TC (not known yet)	IDC (not known yet)
6	+	–	–	+	No malignancy	DCIS (Ø2.0 cm)

+: Suspect lesion, -: No lesion seen.

CM, Contralateral malignancy; RS, Referred side; NRS, Not referred side.

MUMC, Maastricht University Medical Center.

IDC, Infiltrating ductal carcinoma; DCIS, Ductal carcinoma in situ; TC, Tubular carcinoma.

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First Clinical Experience with a Dedicated PET for Hanging Breast Molecular Imaging

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Background: Although 18F-fluorodeoxyglucose (FDG) positron emission tomography (PET) with computed tomography (CT) seems useful for staging and detection of recurrences in breast cancer patients, it is not recommended for detection and/or classification of the primary tumor. Recently, a high-resolution dedicated PET system for hanging breast imaging (MAMMI PET) has been developed to improve primary tumor detection and characterization. The aim of this pilot study was to assess its feasibility for tumor detection and FDG uptake measurements in patients with stage II and III breast cancer.

Methods: 32 patients with invasive breast cancer (26 ductal, 4 lobular, 2 other), prior to and/or during neoadjuvant chemotherapy, underwent both conventional PET/CT and MAMMI PET in prone position with hanging breasts. Conventional PET/CT and MAMMI PET were performed 60±10 min and 110±10 min after injection of 180–240 MBq of FDG, respectively. Primary tumor detection was assessed and FDG uptake, expressed as maximum standardized uptake value (SUVmax), was calculated.

Results: Both MAMMI PET and conventional PET/CT visualized the primary tumor in 31 patients (97%). In 1 patient the primary tumor was occult on MAMMI PET as well as on conventional PET/CT and MRI. The mean distance from the tumor to the pectoral muscle was 26.4 mm (smallest distance 3.3 mm). Agreement in FDG uptake between PET/CT and MAMMI PET was high (r = 0.86, 95% CI 0.69–0.94). However, SUVmax as assessed with MAMMI PET was consistently higher than with PET/CT in all patients with an average ratio of 2.7. Differences in resolution, voxel size, and time between tracer administration and start of the scan might explain this difference.

Conclusion: The dedicated high-resolution breast PET with hanging breast technique is able to visualize approximately all breast tumors in stage II and III breast cancer patients, including tumors in the vicinity of the thoracic wall. This may enable its sequential use in the assessment of response in breast cancer patients receiving neoadjuvant systemic therapy, although SUVmax values are not directly comparable to standard PET/CT.

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Lipid Profiling of Benign and Cancerous Breast Tissues by 1H NMR Spectroscopy in Indian Females

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Background: High resolution NMR spectroscopy is an important tool being used to investigate biochemical alterations in tumors, notably at the level of lipid metabolism. No Indian study / data in this context exists till now. In this ongoing study we did qualitative and quantitative ¹H NMR analysis of lipid extracts of both benign and cancer breast (CaB) tissue to understand the differences between the metabolism of two and thus try to establish its utility as an diagnostic aid in early detection of malignancy.

Material and Methods: The tissue specimens from patients were collected after breast surgeries and were snap frozen in liquid nitrogen. Part of all tissue was sent for routine histopathology. Lipid extraction was performed by using well established Folch method (Folch, 1957) using cholesterol and methanol (2:1 ratio). Tissue samples weighing 200 mg were grounded in the presence of liquid N₂ and then mixed with cholesterol: methanol (2:1) solution and further extracted. The NMR spectra of the extracted lipids was recorded immediately after the sample preparation. These experiments were performed on a Bruker Avance 800 MHz spectrometer.

Results: Over a period of eighteen months histopathologically confirmed 11 benign and 8 CaB were subjected to NMR analysis. Median age for both groups was 47 yrs. The spectral region from 0.5 ppm to 6 ppm shows strong presence of various lipids like cholesterol (Chol), esterified cholesterol (cholE), different side chains of saturated and un-saturated fatty acid, phosphatidylcholine (PL), triacylglycerides (TAG) and there resonance assignment was carried out by this experiment. Qualitatively, there is no difference in these two tissues (benign and malignant). There was significant quantitative difference between different lipid components. In Cancer breast the relative ratio of TAG/PL was found fifteen times lower than benign while that of CholE/Chol was two times higher in Cancer breast. No difference between saturated and unsaturated fatty acid chain in two groups was seen.

Conclusion: ¹H NMR analysis of lipid extract of breast tissue in Indian females shows there is significant elevation of phosphatidylcholine, plasmalogen and esterified cholesterol with decrease in triacylglycerol in cancer breast compared to benign tissue implying that there metabolism is definitely altered in carcinogenesis. This study analyzes the role of NMR as an additional diagnostic tool on the basis of examination lipid extract.

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Axillary Staging – a Useful Pre-operative Planning Tool

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Background: Pre-operative identification of a positive axilla will avoid a patient having to return for a second procedure after a positive sentinel lymph node biopsy as well hopefully reduce false-negative lymph node biopsy which may lead to under-treatment of the axilla.

Materials and Methods: We assessed consecutive patients over a 10-month period (April 2010–January 2011) who presented with a symptomatic breast cancer. All patients underwent axillary ultra-sound at time of diagnosis by the breast radiologist, and core biopsy of any suspicious nodes. Patients referred via the national screening programme, those receiving primary endocrine treatment and those with in-situ carcinoma were excluded. Data was recorded on the pre-operative ultra-sound and biopsy results as well as the final histology following axillary surgery. Recommendations regarding type of axillary surgery were discussed in a multi-disciplinary setting.

Results: Seventy-one patients were assessed during this time period, with a mean age of 60.7 years. Primary tumour size varied from 11–48 mm (mean 24 mm), there were 22 grade 3 carcinomas and 17% of patients were positive for HER2.

Pre-operative ultra-sound identified a positive axilla in 15% of patients thereby avoiding a second operation in 11 women. The sensitivity of axillary ultra-sound was 64% and specificity 94%. Nearly a third of the patients with a false negative axillary ultra-sound had a histological diagnosis of invasive lobular carcinoma.

Conclusions: Pre-operative axillary ultra-sound and core biopsy of suspicious lymph nodes should be considered mandatory in all patients diagnosed with invasive breast cancer. It should be used as an adjunct to formal surgical staging of the axilla by sentinel lymph node biopsy or axillary dissection. Lobular carcinomas appeared to be associated with a higher false negative axillary ultrasound rate. Accurate pre-operative staging tools as well as intra-operative techniques to assess the sentinel lymph node will reduce the number of patients returning for a second axillary procedure following a positive sentinel node biopsy.

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Male Breast Cancer – University Hospitals of Leicester Experience

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Introduction and Aim:

- Male breast cancer accounts for 1% of all breast cancers.
- To analyse the presentation, treatment & outcome of male breast cancer in Leicester.
- Incidence was compared yearly to female numbers.

Methods:

- Analysis of data of all male patients who presented with breast cancer between January 1995 and December 2009.
- We recorded clinical presentation, receptor status, 5 years survival rate, treatment methods and distant metastasis.
- Ratio of episodes of male and female breast cancers every year.

Results:

- 57 patients were recorded.
- Mean age of onset was 71.5 years with a range of 31–90 years
- The most common site was central
- The mean size was 23.3 mm (range: 1 mm–55 mm)
- The most common histological type is invasive ductal carcinoma
- 97.6% patients were oestrogen positive
- 88.9% patients were progesterone positive
- 10.5% patients developed metastasis. The sites of metastasis are shown in the graph.
- 5 years survival was 55.6%
- A total of 29 male patients (51%) diagnosed between 1995–2009 have died. Causes of death were identified for 16 of these patients and are shown in the graph
- Average age at death was 79.4 years (range: 54–92)
- 41 patients underwent surgery
- 38 patients underwent a mastectomy and 3 had wide local excisions.
- 16 Patients had no surgery and the reasons are shown in the chart.
- The average incidence ratio between male to female is 0.7%

Conclusions:

- In Leicester Male Breast cancer accounts for 0.7% of all breast cancer
- Most common site was central
- Majority were oestrogen and progesterone positive
- Most were invasive ductal carcinoma
- Most common surgical treatment was mastectomy
- 5 year survival is 55.6% which falls between 44% (1982) to 75% (1986) found at Helsinki University Hospital.
- Most common cause of mortality in these patients was due to the breast cancer.
- The number of new female breast cancer patients is slowly increasing over the years, whereas the incidence of male breast cancer patients is variable, however has decreased since 2006.
- There is no direct correlation between male and female breast cancer incidence.

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Correlating Breast Density Measured by MRI and Diffuse Optical Spectroscopic Imaging During Neoadjuvant Chemotherapy

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Background: Using MRI, we have shown that the density of the contralateral normal breast is reduced during neoadjuvant chemotherapy (NAC). Diffuse optical spectroscopy imaging (DOSI) can quantify components of breast density because of its strong sensitivity to hemoglobin, water and bulk lipid concentrations. In this study, DOSI was used to image normal breast tissue of breast cancer subjects undergoing NAC and the results were compared to fibroglandular tissue volume measured by MRI.

Material and Methods: A total of 15 breast cancer subjects (9 pre- and 6 post-menopausal) undergoing NAC were investigated. Broadband DOSI measurements of the contralateral normal breasts of the subjects were performed using a handheld probe placed on the breast surface. Tissue concentrations of hemoglobin, water, and lipid were calculated at each measurement point. MRI was performed on a 3.0T Philips scanner for 7 of the 15 subjects. All subjects were measured prior to the first infusion and repeatedly throughout NAC. The fibroglandular tissue was segmented on MRI, and the volume was calculated for comparison.

Results: Of the 7 subjects with MRI, there were a total of 22 corresponding DOSI+MRI studies done at different times during the NAC. The MRI fibroglandular tissue volume had a high correlation with water concentration ($r=0.659$, $p=0.0008$) and total hemoglobin ($r=0.650$, $p=0.0011$), and weaker correlation with bulk lipid concentration ($r=-0.503$, $p=0.017$). In the whole study population, premenopausal and postmenopausal subjects exhibited a 12.9% ($\pm 14.0\%$ SD) reduction and 5.3% ($\pm 2.1\%$ SD) increase, respectively, of normal breast tissue water