technique which is widely available and less time consuming. Patients who are positive on AUS guided FNAC can proceed for ALND directly thereby obviating the need for SNB.

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Detection of extra-axillary lymph nodes with FDG PET/CT in patients with locally advanced breast cancer

T.S. Aukema[1], M.E. Straver[1], M.T.F.D. Vrancken Peeters[1], N.S. Russell[2], K.G.. Gilhuijs[3], W.V. Vogel[4], E.J.T. Rutgers[1], R.A. Valdés Olmos[4]. *[1]Netherlands Cancer Institute/Antoni van Leeuwenhoek Hospital, Surgery, Amsterdam, The Netherlands; [2]Netherlands Cancer Institute/Antoni van Leeuwenhoek Hospital, Radiotherapy, Amsterdam, The Netherlands; [3]Netherlands Cancer Institute/Antoni van Leeuwenhoek Hospital, Radiology, Amsterdam, The Netherlands; [4]Netherlands Cancer Institute/Antoni van Leeuwenhoek Hospital, Nuclear Medicine, Amsterdam, The Netherlands*

Background: Depicting lymph node involvement in levels or basins other than those addressed by routine axillary lymph node dissection (ALND) may have impact on treatment strategies. Although FDG PET/CT is less sensitive than sentinel node biopsy, its specificity for the detection of axillary lymph node metastases has been shown to be almost 100%. The aim of this prospective study was to assess the incidence of extra-axillary lymph node involvement on baseline FDG PET/CT in patients with stage II-III breast cancer, scheduled for neo-adjuvant chemotherapy.

Material and Methods: Patients with invasive breast cancer of >3 cm and/or lymph node metastasis underwent FDG PET/CT before neo-adjuvant chemotherapy. Baseline ultrasound of the infra- and supraclavicular regions was performed, with fine needle biopsy as needed. FDG PET/CT was performed using a hybrid system (Gemini II, 16-slice CT), 60 minutes after administration of 180–240 MBq 18F-FDG intravenously. Patients were scanned in prone position on a special hanging breast device. Two millimetre slices were obtained of PET and CT. All visually FDG-positive nodes were regarded as metastatic, based on the previous reported high specificity of the technique.

Results: Sixty patients were included. In 17 patients (28%) extra-axillary lymph nodes were detected by FDG PET/CT. Ultrasound guided cytology detected extra-axillary lymph node involvement in 7 of these patients. In 10 patients with positive extra-axillary lymph nodes on FDG PET/CT, ultrasound could not confirm. Lymph nodes outside the axilla on FDG PET/CT were localized in the intra mammary chain (1 lymph node), mediastinal (2 lymph nodes), internal mammary chain (9 lymph nodes), intra- and interpectoral (6 lymph nodes), infraclavicular (5 lymph nodes) and in the contra-lateral axilla (3 lymph nodes).

Conclusion: FDG PET/CT detected extra-axillary lymph node involvement in almost one-third of the patients with locally advanced breast cancer, including in several regions not evaluable with ultrasound. FDG PET/CT may be useful as an additional imaging tool to assess extra-axillary lymph node metastasis, with impact on adjuvant radiotherapy management. Particularly patients with high risk tumours, who are candidates for neo-adjuvant chemotherapy, are candidates for FDG PET/CT.

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MRI characterization of dissected sentinel lymph nodes of breast cancer patients at 7 T

M.A. Korteweg[1], J.J.M. Zwanenburg[1], V.O. Boer[1], P.J. Van Diest[2], R. Van Hillegersberg[3], W.P.T.M. Mali[1], P.R. Luijten[1], W.B. Veldhuis[1]. *[1]University Medical Center Utrecht, Radiology, Utrecht, The Netherlands; [2]University Medical Center Utrecht, Pathology, Utrecht, The Netherlands; [3]University Medical Center Utrecht, Surgery, Utrecht, The Netherlands*

Background: Axillary lymph node status is the most important factor determining breast cancer prognosis. Assessment of nodal status requires surgical resection. This is associated with morbidity. We started a trial comparing non-invasive 3T MRI-based staging to surgical staging. The performance of the 3T in vivo MRI is controlled by 7T ex vivo MRI of all surgical specimens. This is followed by a node-to-node matching to pathology. Here we describe the results of the 7T MRI characterization of dissected sentinel nodes of breast cancer patients, with pathology as the gold standard.

Materials and Methods: We included 20 consecutive breast cancer (stage $\geqslant$T2) patients about to undergo a sentinel node biopsy. 7T scan protocol included a morphological 3D-T1 weighted (3D-T1W) scan (180μm isotropic resolution). Also the mean absolute T1, T2, T2* relaxation times and apparent diffusion coefficients were determined, as were the 3D nodal dimensions and the presence of a fatty hilus. To maintain accurate correlation of MRI to pathology, the nodes were mapped, numbered and dyed to detail their anatomical orientation. Next they were sliced in 4 mm sections, paraffin embedded, cut into 3μm thick slices and stained with Haematoxylin & Eosin. Statistical analyses; logistic regression analyses according to the generalized estimating equations method.

Table 1. T1, T2*, T2, apparent diffusion coefficient (ADC), and width × height × depth (w×h×d) for all nodes[a]

	Healthy	Metastatic	Significance
T1, ms	1454 (557)	1569 (661)	0.17
T2*, ms	15 (2)	19 (5)	0.01
T2, ms	30 (3)	34 (8)	0.02
ADC, mm^2/s	0.11×10^{-3} (0.1)	0.11×10^{-3} (0.1)	0.91
w×h×d, mm^3	873 (1203)	1725 (1211)	0.23

[a]Values are mean (±standard deviation [SD]).

Results: All 83 nodes could be matched to pathology, allowing correlation of intra-nodal imaging features to pathology. Table 1 shows the quantitative analyses. 77% of benign and 64% of malignant nodes had a fatty center. On the 3D-T1W scans, lymph- and blood vessels, cortical fat, activated b-cell follicles and a metastasis in a lymph vessel were identified. Intranodal metastases could not be localized morphologically.

Conclusion: While the intranodal location of metastases could not be delineated, there was a significant difference in T2 and T2* relaxation times between metastatic and non-metastatic nodes. Also, the very high resolution scans allowed identification of structural nodal details and detection of a small in-transit metastasis in a lymph vessel.

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Contrast-enhanced magnetic resonance imaging as problem solving modality in mammographic BIRADS 3 lesions

M.D. Dorrius[1], R.M. Pijnappel[2], M.C. Jansen-van der Weide[1], M. Oudkerk[1]. *[1]University Medical Center Groningen, radiology, Groningen, The Netherlands; [2]Martini Hospital, radiology, Groningen, The Netherlands*

Background: The purpose of this study is to determine whether contrast-enhanced Magnetic Resonance Imaging (MRI) can be used as problem solving modality in breast lesions which were classified as BIRADS 3 with mammography.

Materials and Methods: In this study 191 patients had a mammographic BIRADS 3 lesion. 77 out of the 191 patients underwent a breast MRI as work-up. MRI scans were obtained on a 1.5T MR scanner (Avanto; Siemens) using a dedicated bilateral breast coil. The standard MRI protocol included a T2 Turbo Spin Echo, a T1 3D FLASH sequence before and after intravenous contrast medium and a T1−3D FLASH water excitation. MRI scans were coded using the ordered categories of the ACR BIRADS lexicon. The sensitivity, specificity, positive predict value (PPV), and negative predictive value (NPV) were calculated on the basis of final pathology reports or long-term clinical and radiological follow-up findings over at least 2 years. Lesions which were classified as BIRADS 3, 4 or 5 at breast MRI were considered positive for malignancy.

Results: Fifty-four out of the 77 mammographic BIRADS 3 lesions were correctly classified as BIRADS 1 or 2 with MRI. Eleven lesions were classified as BIRADS 3. Two out of these 11 lesions showed malignancy with pathology. Seven lesions were classified as BIRADS 4. Six out of these 7 lesions were malignant. Five lesions were classified as BIRADS 5 and pathology confirmed malignancy in all cases. The breast MRI had a sensitivity of 100%, specificity of 84.4%, PPV of 56.5% and NPV of 100%. Thirteen (16.9%) out of the 77 mammographic BIRADS 3 lesions were malignant.

Conclusion: Our results indicate that breast MRI can be used as problem solving modality in mammographic BIRADS 3 lesions to rule out malignancy.

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Positron emission tomography combined with computed tomography (PET-CT) in asymptomatic breast cancer patients showing elevation of circulating tumour markers

C. Garcia[1], B. Borens-Fefer[2], K. Muylle[1], P. Flamen[1]. *[1]Institut Jules Bordet. Université Libre de Bruxelles (ULB), Nuclear Medicine, Bruxelles, Belgium; [2]Erasme Hospital. Université Libre de Bruxelles (ULB), Radiology, Bruxelles, Belgium*

Background: Routine tumour marker testing after surgery in the follow-up of asymptomatic patients suffering from breast cancer still remains a controversial issue and international guidelines not recommend the use of carcinoembryonic antigen (CEA) and/or carbohydrate antigen (CA 15−3) to detect recurrence after a primary breast cancer therapy. However, due to multiple factors, several patients and physicians do not accept only monitor