considered as a negative outcome. None of these patients developed local recurrence during follow-up.

Conclusions: SLNB is a safe and reliable method for staging the axilla in patients with invasive breast cancer. However there is a chance of developing local recurrence (1.0%) and distant recurrence (2.0%). Long-term follow-up will prove whether these percentages will remain constant. Patients with submicrometastases in the SLNB did not develop any axillary recurrence.

319 Poster

Detection of the sentinel lymph node in breast cancer: a comparison between two radiotracer injection techniques: periareolar and intratumoral

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Background: It is believed that preoperative detection of the sentinel node (SN), through periareolar cutaneous injection, presents advantages over other techniques. However, few data have been published comparing the different ways of administration. The aim of this study is to compare the periareolar (PA) vs. Intratumoral (ITU) methods of radiotracer for detection of SN.

Material and Methods: Twenty-three women with breast-cancer (T1-T2) were investigated. Chemotherapy, non-oncological breast surgery and previous axillar surgery, pregnancy, palpable axillary lymph node and inflammatory breast cancer were excluded. All patients were submitted to both methods. Firstly, the radiotracer was injected into the tumor guided by a radiological study. Scintigraphic images were acquired with a Gamma camera filled with a high-resolution collimator in order to document the number, place of migration and uptake in the SN. Acquisitions were done with patient's arms in the surgical position. After radiotracer injection, dynamic and static images were obtained at 1 and 3 hours, respectively, in anterior and lateral views. After conclusion of first stage, the patient received another intradermic and periareolar injection of the radio tracer, in the same quadrant of the primary lesion. Scintigraphic images was the second technique were obtained in the same manner. Fisher's exact test was used for statistical analysis, considering significant a $P < 0.05$.

Results: In the PA technique, 22/23 (95.6%) cases were identified, while in the ITU 20/23 (86.9%). Nineteen patients presented the same number and localization of the SN, with the two injection techniques. Three presented migration only with periareolar injection (axillary), and one presented a migration only with intratumoral injection at the internal mammary SN ($P = 0.6$). The rate of lymph node metastasis was 20%, all detected through both techniques.

Conclusion: There is no difference between PA and ITU technique to identify SN in breast cancer.

320 Poster

One Step Nucleic Acid Amplification (OSNA) as an intra-operative diagnostic tool for the assessment of the sentinel lymph node status in breast cancer patients

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Background: The detection of sentinel lymph node (SLN) metastases in breast cancer patients is conventionally determined by intra-operative histopathological examination of frozen sections or touch imprints. However, due to a poor sensitivity of these techniques, postoperative identification of metastases on paraffin embedded sections can lead to second surgery axillary lymph node dissection. A more efficient molecular assay called One Step Nucleic Acid Amplification (OSNA) for intra-operative identification of metastatic disease in SLN has been evaluated in several clinical studies. We present here the results from the intra-operative use of OSNA within the operating theatre.

Material and Methods: OSNA includes a short sample preparation step followed by automated measurement of cytokeratin 19 mRNA copy number directly from the homogenate and can be carried out by every laboratory technician after a brief familiarisation phase.

Before homogenisation of the whole node a 1 mm middle slice was reserved for histology. 257 SLN from 110 breast cancer patients were investigated. If OSNA was negative then Haematoxylin & Eosin (H&E) staining was performed every 200 μm; in case OSNA was positive, only one H&E section was made.

Results: Fourteen patients were positive and 81 were negative with both methods. In 4 patients OSNA indicated the presence of a macrometastasis and in 9 patients a micrometastasis whereas histology was negative, a result which was rather expected as about 90% of the tissue was referred to OSNA. The positivity rate obtained by OSNA was 24.5%. In one patient a micrometastasis was found in the 1 mm middle slice and OSNA was negative. One SLN was histology+/OSNA-, indicating CK19 low expression on a protein and RNA level.

Conclusions: OSNA is a standardised, easy to learn procedure for intra-operative detection of SLN metastases in breast cancer patients and prevents patients from a diagnostic delay or second surgery due to a postoperatively diagnosed cancer positive SLN. Since most or all of the tissue can be analysed by OSNA, the chance of a sampling bias due to uninvestigated material is very low.

321 Poster

Usefulness of clinical exploration, ultrasound and MRI for the assessment of axillary lymph nodes status previous to the performance of sentinel node

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Background: The aim of this study was to compare sensibility and specificity of clinical exploration, ultrasound and MRI to assess the status of axillary lymph nodes, as a high detection of positive lymph nodes previous to the surgical procedure lowers the probability of a false negative sentinel node.

Materials and Methods: we retrospectively reviewed T1 and T2 breast cancers not candidate for neoadjuvant chemotherapy, treated in our breast cancer unit from September 2008 to September 2009. Data on clinical exploration (CE), axillary ultrasound (AU) and MRI were reviewed for each patient. The pathology exam of the surgical specimen (sentinel node or lymphadenectomy) was reviewed for each patient and sensibility and specificity were calculated for each exploration method and for the three methods together. Sensibility was also calculated separately in patients with only 1 lymph node affected and in patients with more than one lymph node affected in the pathology exam of the surgical specimen.

Results: 99 patients with T1 and T2 breast cancer were included in the study. Results for CE were found in 34 patients. Sensibility for CE was 41% and specificity 100%. Data on UE were found in 88 patients: sensibility for ultrasound was 28% and specificity 87%. Data on MRI were found in 33 patients: sensibility was 50% and specificity 100%. Data on the three explorations were found in 16 patients: sensibility of the three explorations together was 57% and specificity 100%. In patients with one positive lymph node in the pathology exam of the surgical specimen, sensibility for CE was 16%, for UE was 12.5% and for MRI was 16%. Regarding patients with more than on positive lymph node, sensibility for CE was 66.6%, for UE was 55.5% and for MRI was 100%.

Conclusion: MRI is the exploration with a higher sensibility and specificity to assess the preoperative status of axillary lymph nodes. Sensibility increases using CE, AU and MRI all together. Infiltrated lymph nodes are better detected when more than one node is affected. A careful clinical examination is of great value to assess axillary nodes status, as sensibility and specificity could be even higher than an ultrasound exam.

322 Poster

Intra operative sentinel node metastasis detection in breast cancer by one step nucleic acid amplification: Rennes Cancer Institute experience

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Background: Sentinel lymph node (SLN) biopsy is widely used as a staging procedure in early breast cancer. Conventional methods for intra-operative assessment have a low sensitivity and lead to second surgeries when the SLN is metastatic during post-operative histology. The One-Step Nucleic Acid Amplification OSNA® method was validated to detect metastases ($\geqslant 0.2$ mm) by amplification of CK19 mRNA on SLN lysates. We report the experience of our institution since we implemented OSNA® for intra-operative clinical use.

Methods: From each fresh SLN, a central slide of 1 mm was investigated by first intra-operative touch imprint examination followed by permanent histology. The other 2 parts of the node were completely analysed by OSNA. The analysis is performed on SLN lysates on pure sample preparation and on a diluted sample (1/10). CK19 mRNA copy numbers per

μl of lysate determine the node status. OSNA® results are designated as (−) no metastasis (⩽0.2 mm), (+) micrometastasis, (++) macrometastasis, (+)I positivity in the diluted sample only.

Results: 344 SLNs from 160 patients T0, T1 or T2 were analysed. OSNA® detected 15 (++), 11 (+) and 8 (+)I while respectively 13, 2 and 1 were also found positive by permanent histology leading to a positivity rate of 21.25% (34/160). The definitive histology found 5 micrometastasis while OSNA® results were (−) leading to SLN positivity rate of 25%. Additionally, Isolated tumor cells were found for 4 patients. 30 axillary node dissections have been performed in the same surgical session according to OSNA results and 8 have been delayed (6 for positive permanent histology and 2 because of intra-operative OSNA® technical delays). Non-SLNs involvement were shown for 6 patients, all were OSNA® positive. OSNA® median time analysis was 35 min for 2 SLNs and about 5 more min per additional node.

Conclusion: We are not surprised to find discordance between OSNA® and histology for micrometastasis because of the cutting protocol leading to tissue allocation bias. For macrometastasis 13/15 cases were concordant. Finally 138/160 patients are concordant, the positivity rate is 25% in agreement with the literature and our retrospective data with conventional histology practices. Therefore we are confident with the OSNA® system. OSNA® is a rapid tool for intra-operative assessment of SLN status and allowed us to avoid a recall for second axillary dissection for 30/160 patients, while only 7/160 by touch imprint.

323 Poster

Does intra-operative assessment of sentinel lymph nodes cause over-running of theatre lists or cancellation of operations?

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Background: Touch imprint cytology (TIC), is a simple intra-operative assessment of sentinel lymph node (SLN). It provides an immediate result, allowing the surgeon to proceed to an axillary lymph node clearance in patients who are positive for metastasis and avoid a second operation. However proceeding to axillary clearance needs extra theatre time and there is potential for 'over-running' and disruption of a theatre list. The aim of the study was to assess the time required for TIC and if this resulted in 'over-running' of theatre or cancellation of other operations in the theatre list.

Methods: This was a prospective audit of 53 patients who underwent SLN biopsy and TIC. Sentinel lymph node (SLN) biopsy was performed first and sent for TIC. While waiting for the results, surgeon continued with wide local excision or mastectomy. Once TIC assessment was complete the results were phoned to theatre by the pathologist. All timings were recorded prospectively.

Results: Altogether 75 SLNs were biopsied in 53 patients. The mean number of SLNs subjected to TIC for each patient was 1.4 (range 1−3). Average time from harvesting of the nodes to receiving of result of the TIC for each patient was 31 minutes (range 15−53). This was proportional to the number of nodes. Average time taken for each lymph node was 19 minutes. Prolongation of the operation due to TIC was seen in only 9 patients (17%), on an average by 6 minutes (range 1−15). 3 patients (7.4%) had positive TIC and required axillary clearance during primary procedure. 2 out of 38 (5%) theatre lists over ran due to positive TIC and axillary clearance. No operations were cancelled due to TIC.

Conclusion: Prolongation of operation was seen in only 17% of patients on an average by 6 minutes. The chance of 'over-running' of theatre list was only around 5%. No other operations in the theatre list had to be cancelled due to TIC. Thus intra-operative assessment of sentinel lymph node by TIC can be included in the routine practice without major disruption of theatre time.

324 Poster

Axillary ultrasound examination is useful for selecting optimal patients suited for sentinel node biopsy after primary systemic chemotherapy

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Background: An accurate evaluation of axillary lymph node (ALN) involvement is essential for the therapeutic indication of sentinel lymph node (SLN) biopsy (SLNB). Although at present breast cancer patients are treated more frequently with primary systemic chemotherapy (PSC), the reliability of SLNB after PSC remains controversial. The aim of this study was to examine the utility of axillary ultrasound (AUS) examination for selecting optimal patients who were suitable for SLNB after PSC.

Material and Methods: Between June 2007 and October 2009, 56 patients with AJCC Stage II or III breast cancer, treated with anthracycline and/or taxane-based PSC and who underwent SLNB followed by complete ALN dissection, were enrolled for the study. All patients underwent AUS before and after PSC for axillary staging. Lymph nodes that were swollen, irregularly shaped, homogeneously hypoechoic without an echo-rich center, and/or had an abundant inflow bloodstream were defined as AUS-positive, in consideration of potentially massive nodal involvement. The preoperative diagnostic accuracy of AUS was compared with other methods such as palpation and positron emission tomography/computed tomography with ^{18}F-fluorodeoxyglucose (^{18}F-FDG PET/CT).

Results: An SLN was successfully identified in 46 patients (82%). The sensitivity of SLNB was 84.8% (28 of 33 patients) and the false-negative rate was 15.2% (5 of 33 patients).

AUS-negative patients both before and after PSC (11 patients) had a better identification rate (91%; 10 of 11 patients), sensitivity (100%; 6 of 6 patients) and false-negative rate (0%; 0 of 6 patients) compared with AUS-positive patients before and/or after PSC (80%, 81.5%, and 18.5%, respectively). The results of AUS were also better than those from palpation and ^{18}F-FDG PET/CT.

Conclusion: SLNB after PSC is feasible and an accurate method for predicting the ALN status of patients who are AUS-negative both before and after PSC. AUS might be recommended for inclusion in assessments during PSC and before surgery for selecting optimal patients suited for SLNB after PSC due to its utility, easy availability, safety (no radiation exposure), and cost-effectiveness. Long-term examinations of more cases are necessary.

325 Poster

Metastatic internal mammary lymph nodes in breast cancer: target patients and management implications

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Background: Management of internal mammary sentinel nodes (IMN) in breast cancer is controversial.

We evaluate the target patients of metastatic IMN and we assess its effect on staging, prognosis and treatment of breast cancer.

Material and Methods: We have performed a retrospective study on T1-T2N0 breast cancer patients with lymphoscintigraphic drainage and surgical approach to IMN at the Bellvitge Universitary Hospital from 2000 to 2004. Two groups were considered: positive and negative IMN. Specific tumor characteristics, treatment modification, disease-free survival (DFS) and overall survival (OS) were contrasted by Fisher exact test.

Results: From 682 lymphoscintigraphy performed, 61 IMN drainage were seen and surgical approach was completed in 27 patients. Six patients (22%) had metastatic IMN. Analyses of patients and breast cancer characteristics in both groups are presented in the table.

	IMN	
	Positive	Negative
Mean age	47	48
Premenopausal status	66%	50%
Inner quadrant localization	83%	38%
Histological grade III	**83%**	**28%**
Mean tumor size	16.1 mm	16.6 mm
Invasive ductal carcinoma	100%	95%
Metastatic axillary nodes	0	10.5%
Adjuvant chemotherapy	**100%**	**57%**
IM Radiotherapy	**50%**	**0%**
Adjuvant hormonotherapy	100%	81%
DFS	100%	91.5%
OS	100%	100%

Positive IMN modified treatment in 4 cases (80%) by adding CT (2 cases) or RT (2 cases). Average follow up was 57.5 months.