Friday, 26 March 2010 18:15–19:15

POSTER SESSION

Detection, diagnosis and imaging

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Follow-up CT of PET-CT detected hypermetabolic lesions in breast cancers

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Background: To evaluate the outcomes of the PET detected hypermetabolic lesions in the lungs of breast cancer patients, as correlated with follow up CT findings and to analyze the PET and CT findings of hypermetabolic lesions in PET-CT for differentiation benign from malignancy.

Materials and Methods: For recent 4 years, we retrospectively analyzed the PET-CT and follow up chest CT findings of breast cancer patients. Total 61 patients were included (age range from 34 to 69 years old). The inclusion criteria were (a) one or more hypermetabolic foci, regardless the dimension of PET-CT (Gemini TF, Philips Medical System, Netherlands), (b) a peak SUV (standardized uptake value) is over 2.5, higher than that of mediastinum, and (c) a newly developed lesion, compared with preoperative or initial PET-CT. In 9 patients, pathologic correlation was done for the nodule or consolidative lesions (percutaneous needle biopsy in 7, excision in 2). Remaining 52 patients, follow up CT scans were done.

Results: Total 61 patients were included (age ranging from 34 to 69 years old). The mean interval between PET-CT and chest CT was less than 51 days (from 3 to 102 days). In 9 cases, three were granulomas, four cases were metastatic lesions from breast cancer, two cases were primary lung cancers (bronchioloalveolar carcinomas). Remaining 52 patient, lesions were decreased (26) or disappeared (9) on follow up CT scans. In fifteen patients, the nodular lesions were stable over 2 years follow up.

Conclusions: In the patient of breast cancer follow up with hypermetabolic foci, detected on follow up PET-CT, dedicated CT scan is essential. Most of the lesions were transient findings, such as eosinophilic pneumonia. But relative high percentage of metastases (4/61, 6.6%) and double primary lesions (2/61, 3.3%) were diagnosed. As correlated with clinical findings, pathologic and laboratory correlations are important to exclude metastatic or new malignant lesions.

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Evaluation of the effectiveness of the FDG-PET (positron emission tomography)-CT as the preoperative method for the breast cancer

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Background: FDG-PET-CT is effective as a search of the distant metastasis in breast cancer as Preoperative management. However, the accumulation to the primary lesion changes by a case. In comparison with the pathological findings of the primary lesion, we evaluated the effectiveness of FDG-PET-CT.

Materials: Fifty-five patients were recruited, 57 lesions were analyzed. The cases of DCIS (ductal carcinoma in situ) or neoadjuvant chemotherapy were excluded. Max SUV (standardized uptake value) more than 2 of the primary lesion provide the significant accumulation in FDG-PET-CT.

Results: 35 lesions were accumulated in Max SUV more than 2. The mean tumor size is 30.0 mm in the group of Max SUV more than 2, but 19.7 mm in the group of Max SUV less than 2. 13 in 14 lesions of ER negative cases were accumulated significantly for 22 (51.6%) in 43 lesions of ER positive cases. 10 (83.3%) in 12 lesions in HER2 positive cases were accumulated significantly 24 (54.5%) in 44 lesions in HER2 negative cases. In particular, triple negative cases (ER(−)/PgR(−)/HER2(−)) were accumulated significantly for 5 (83.3%) in 6 lesions. In nuclear grade, grade 3 8/11 (72.7%) were accumulated significantly for both of grade 1 23/38 (60.5%) and grade 2 4/7 (57.1%). In nuclear mitosis, score 3 5/6 (83.3%) were accumulated significantly for both score 1 24/41 (58.5%) and score 2 5/8 (62.5%). In status of lymphvascular invasion, 15 (60%) in 25 lesions of positive status were not accumulated significantly for 20 (62.5%) in 32 lesions of negative status. 9 (69.2%) in 13 lesions of positive lymph node metastasis were accumulated significantly for 22 (55%) in 40 lesions of negative lymph node metastasis.

Conclusions: The cases of Max SUV more than 2 of FDG-PET-CT were accumulated significantly in that biological characteristics are malignant, therefore, these cases needed adjuvant chemotherapy mostly. FDG-PET-CT as the preoperative method evaluate biological characteristics and we will be able to select the case of neoadjuvant chemotherapy.

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Breast cancer risk and detection after chest wall irradiation for paediatric neoplasms

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Background: High number of long term survivors after chest wall irradiation develop a second cancer that may be the leading cause of death. This is particularly relevant after paediatric neoplasms, since radio-induced breast cancer may occur earlier than expected in general population, when screening programmes are not applied for early detection. The strategies for surveillance are not well defined and no suggestions exist. The aim of this study was to evaluate the long-term risk to develop breast cancer in this subgroup of patients by an intensive screening programme.

Patients and Methods: We planned to enrol females regularly followed at the National Cancer Institute of Milan that were treated with chest wall radiotherapy for paediatric cancer. In 2002 we identified a cohort of patients who were at least five years disease free. They were contacted by mail, inviting them to follow a specific surveillance program for early diagnosis of breast cancer; 86 women answered with acceptance and represent the subject of this study. Clinical Breast Examination (CBE), Mammography (MX) and Ultrasonography (US) were yearly performed for breast cancer screening. From October 2007 Magnetic resonance (MR) was introduced in the screening round.

Results: Nine patients had pathologically proved breast cancer and the over all incidence of breast cancer was 2.3%. Median age at diagnosis was 33 (range 26−49 years). Seven cancer were invasive (three were stage I and four were stage II); the remaining was in-situ. We found a sensitivity of 44%, 78% and 56% for CBE, MX and US respectively. Three patients had a pattern of microcalcifications detected by MX as sole finding. After that RM was introduced, one cancer was diagnosed and detected only by RM.

Conclusion: We don't know whether this intensive screening programme is able to provide an effect in terms of saved years of life in such high risk women, further studies are required to give an answer to this specific question. In the meantime we agree with most authors suggesting a specific surveillance for the earlier detection of breast cancer after chest wall irradiation.

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Prognostic value of screen-detection in invasive breast cancer; a hospital-based consecutive cohort of 2592 patients

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Background: Mammographic screening has led to a proportional shift towards earlier stage breast cancers at presentation. The aim of our study was to assess whether method of detection yield survival benefit beyond stage migration.

Material and Methods: Patients aged 50−69 years diagnosed with invasive breast cancer between 1990 and 2001 were selected from a Dutch cancer hospital. We identified 3 types of carcinomas based on method of detection: 1) screen-detected, mammographically detected in first or subsequent screening rounds (n = 958); 2) interval, diagnosed during the interval between two screening rounds and <24 months of a negative screening (n = 417); 3) non-screenings-related, symptomatic carcinomas in patients who were not (or no longer) participating in the screenings program (n = 1217). Cox proportional hazard models were used to calculate hazard ratios (HRs) for method of detection adjusted for stage and adjuvant systemic therapy. Because of the gradual implementation of population-based screening in the Netherlands, analyses were stratified in two periods of diagnosis, i.e. 1990–1996 (introduction; n = 1614) and 1997–2000 (full coverage; n = 978).

Results: Screen-detection was a significant predictor for prolonged OS and BCSS compared to non-screenings-related carcinomas. This effect was irrespective of period of diagnosis, with adjusted HRs for OS and BCSS of 0.77 (95% CI 0.64–0.92; p = 0.005) and 0.66 (95% CI 0.50–0.86; p = 0.002), for patients diagnosed between 1990 and 1997, and 0.73 (0.52–1.02; p = 0.07) and 0.63 (95% CI 0.40–1.01; p = 0.05) for patients diagnosed between 1997 and 2001, respectively. The survival benefit of screen-detection was comparable across tumor size and nodal status categories,

though most pronounced in patients with tumors ⩽10 mm and patients with node-negative disease. Patients with an interval carcinoma diagnosed before 1997 had a better OS and BCSS, whereas patients diagnosed with interval carcinomas diagnosed between 1997 and 2001 had similar outcomes compared to patients with non-screenings-related cancers in the corresponding time period.

Conclusions: Screen-detection is an independent prognostic factor and resulted in an additional BCSS benefit of 34% beyond stage migration. Therefore, method of detection should be taken into account when selecting patients for adjuvant systemic therapy.

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A focused, PCR based gene expression signature to refine grade in breast cancer

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Nottingham grading system is used to classify breast carcinomas of different histological appearance and clinical behavior into well-differentiated (grade 1), moderately (grade 2) and poorly differentiated (grade 3) subgroups. Major limitations of this system are interobserver variability and the grade 2 group of tumors which display intermediate characteristics. Further, when considering clinical behavior and treatment options this group of breast carcinomas does not compose an uniform cluster.

Recent studies suggested that grade 2 tumors can be split into high and low grade tumors with reasonable confidence, replacing the three grades with a high and low grade tumor subtype. This has been achieved with the use of microarray analysis, which is associated with a rather high cost rendering its use in routine pathological diagnosis impractical.

The genes contained in the gene expression signatures used for grade refinement show a high level of pairwise Pearson correlation coefficients (>0.7) across several breast cancer cohorts. This suggests that most grade refining genes reflect the same biological information, therefore a few appropriately selected genes will provide the same grade associated information as the tens or hundreds of genes used in the microarray analysis.

On the basis of histological grade, we evaluated 314 invasive breast carcinomas consisting of 106 grade 1, 116 grade 2 and 91 grade 3, formalin-fixed and paraffin-embedded tissue samples. After RNA purification and reverse transciption, qRT-PCR method was able to validate the proposal of the in silico analysis. We selected 5 genes (AURKA, TOP2A, FOXM1, TPX2) that are present in grade refining signatures (Sotiriou et al. J Natl Cancer Inst. 2006, Carter et al. Nat Genet 2006) and CLDN4 which is gaining more importance considering the recently described claudin-low subtype.

We present the results of our analysis which was able to split grade 2 carcinomas into low and high genomic grade clusters, thus, making it possible to reclassify breast cancer into different prognostic groups and aid therapeutic decision making.

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Unprecedented results of a clinical validation of the dedicated and highest resolution breast PET

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Background: This work aims to evaluate the first prototype of a mini-PET ring detector (MAMMI) dedicated for early cancer diagnosis. To show the first clinical images with an unprecedented spatial resolution and increased sensitivity of the MAMMI in comparison with a whole-body PET/CT.

Methods: After a pre-clinical test period the first prototype of the MAMMI mini-PET is being validated at the Netherlands Cancer Institute in a group of patients with histologically confirmed breast cancer. Images are obtained immediately after PET/CT (GeminiTF, Eindhoven, The Netherlands). PET/CT images are acquired 60 minutes after administration of 180–240 MBq 18F-FDG with the patients positioned on a special device that allows the breasts to hang down offering their maximum volume. Subsequently to the main sequence acquired with the PET/CT 10−20 min studies (depending on breast length) are performed with the MAMMI mini-PET without the need of additional dose administration. The PET/CT study counts with attenuation correction through the CT acquisition. In contrast, the MAMMI reconstruction uses 3D MLEM (voxel size of 1 mm) and an innovative attenuation correction through breast-air binarization has been obtained. Other corrections nemaly random and scatter were also satisfactorily applied during the reconstruction process. Breast lesion 18F-FDG SUVmax and tumor/background ratios were measured on PET.

Results: The new and dedicated breast PET has demonstrated to acquire images with a spatial resolution near 1.5 mm and highest physical sensitivity for this type of detectors. The mini-PET reconstructs images using a Maximum Likelihood Expectation Maximization 3D algorithm in about 15 min for a transaxial FOV of 170 mm in diameter and 40 mm axial in one shoot. However, an expanded 2D algorithm has also been developed to reconstruct the same volume within just 1 min. The whole axial FOV varies as a function of the breast length. A reliable SUV serves the user to accurately quantify the tumor and surrounding tissue.

Conclusion: An innovative dedicated breast PET ring detector with unprecedented spatial resolution aimed for early breast cancer detection has been pre-clinically tested. A clinical validation study of this mini-PET in comparison with a whole body PET/CT device is in progress at the Netherlands Cancer Institute in order to evaluate the possible advantage of the new system when related to small breast lesions.

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Outcomes of incidentally detected breast lesions on chest CT, based on histopathologic correlation

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Background: To analyze of the histopathologic findings of incidentally detected breast lesion by chest CT scan and to predict the imaging findings of suggesting malignancy.

Materials and Methods: We retrospectively reviewed the medical records of 41 cases of breast abnormalities, detected by chest CT scan (64-detector row CT (Brilliance 64; Philips Medical Systems, Netherlands)) for screening and diagnostic CT scan (total 498 CT scans). Most of the patients were women (M:F= 3:38). The age varies from 31 to 78 years old. The clinical indication of for chest CT scan were evaluation of the chest abnormalities, detected in chest radiography (112, 22.5%), lung cancer screening (97, 19.5%), preoperative evaluation for malignancy except breast (86, 17.3%), evaluation for pulmonary metastases from other organs (75, 15.1%), work up for infectious diseases (e.g., tuberculosis, pneumonia) (61, 12.2%), clinical history of hemoptysis (49, 9.8%), unknown cause (18, 3.6%). Follow up evaluation were done by breast US and mammography. Histopathologic correlation was done if there's any finding, suggesting malignancy and over category 4a lesions and follow up breast US were done for cat. 3 lesions.

Results: Of 41 patients, 13 cases (31%) were confirmed as malignancy (8 invasive ductal carcinoma, 2 ductal carcinoma in situ, 1 mucinous carcinoma, 1 small cell carcinoma, 1 lymphoma). Remaining 28 cases were benign lesion, (19 were fibrocystic disease, 7 were fibroadenomas, 2 were intramammary lymph nodes). The CT features, suggesting malignancy were speculated margin (8/13), peripheral rim enhancement (5/13), axillary node enlargements (4/13), central low attenuation area (3/13), perilesional infiltrations (3/13). Associated calcifications, size and multifocal nodular enhancement were also shown in malignant lesions. Conversely, smooth well defined margin of the mass was more common in benign lesions (17/28 cases).

Conclusions: Based on our study, significant rates (31%) of malignancy among the detected abnormalities in chest CT scan. The most common abnormality in malignancy is invasive ductal carcinoma. The CT findings of spiculated margin and peripheral enhancement with axillary lymphadenopathy were reliable findings in predicting malignancy.

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Is 18FDG-PET CT available for detection of preoperative axillary lymph node metastasis in invasive ductal carcinoma?

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Background: 18FDG-PET/CT has been recommended as a preoperative staging modality of advanced breast cancer, but the availability of 18FDG-PET/CT is still remained controversial. This study was designed to give ideas using 18FDG-PET/CT for axillary lymph node (ALN) metastasis of invasive ductal carcinoma by comparison positive with negative result group.

Materials and Methods: The subjects are consisted of 176patients with invasive ductal carcinoma who underwent operations on Pusan National University Hospital from January 2007 to December 2008 and preoperative 18FDG-PET/CT. Among 65patients with metastatic ALN comfirmed on permanent pathologic result, 31patients with and 34 patients without