

ORAL SESSION

E1

PRIMARY SYSTEMATIC TREATMENT OF BREAST TUMOUR: LINKS BETWEEN DIAGNOSTIC EXAMINATIONS OBJECTIVE

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Background: The role of metabolic imaging is increasing in the measurement of early therapeutic response during cancer patient treatment. Our aim was to measure the effect of primary systemic chemotherapy (PST) on high risk breast cancer patients by using imaging modalities and pathology diagnostics and to find correlation between the applied modalities. The results of FDG-PET-CT examinations, which helped identify the extent of the tumour and the existence of distant metastasis, were available for therapeutic decision, as well as the core biopsy results which showed the tumour's biological behaviour. We compared the metabolic and morphological response, and analysed the relationship of these responses with the proliferation of the tumour, with special emphasis on changes in Ki-67 expression.

Material and methods: We report 22 (21 women and 1 man) of patients treated with PST during 2008–2010. All of them were examined by FDG-PET-CT for staging before chemotherapy and surgery. We excluded patients with distant metastases on pre-operative PET-CT, and those who refused surgery (lack of tissue samples). Standard Uptake Value (SUV) changes were measured on PET scans in the primary tumour and the axillary lymph node region. The calculated Δ SUVs were compared with morphological changes on native CT, as well as with the changes of the expression of Ki-67 proliferation marker measured by specific immune-histochemistry method in the core biopsy and surgical specimens. For analysing the changes we used two-sample T-test and Spearman rank correlation.

Results: The reduction of Ki-67 levels proved to be significant (49.41% vs. 16.23%, $p = 0.001$). A significant decrease was detected in the SUV of primary tumours (12.18 vs. 2.59, $p = 0.001$), and SUV of the axillary region (11.72 vs. 3.18 $p = 0.009$). A significant reduction was detected in the size of the primary tumour (30.86 mm vs. 17 mm, $p = 0.002$), but in the axillary lymph node region the reduction in size proved to be insignificant (18.58 mm vs. 14.58 mm, $p = 0.319$). Significant correlation was found between Ki-67 and SUV parameters before PST in primary tumours ($p < 0.001$). There was also a significant correlation between initial Ki-67 values and changes in SUV ($p < 0.001$), and between Ki-67 changes and in Δ SUVs ($p < 0.001$, correlation coefficient: +0.734).

Conclusions: Metabolic changes correlate well with the regression indicated by the proliferation marker, and with the pathological tumour response, better than the morphological regression, especially in axillary lymph node region. Beside the Ki-67 expression based on core biopsy, the FDG-PET-CT results may play an essential role in the indication of PST. PET-CT seems useful in the assessment of response to treatment, and it can be particularly significant in assessing the early therapeutic response of the tumours.

E2

COMPARISON OF FDG PET-CT AND MRI DWIBS TREATMENT FOLLOW UP EXAMINATIONS IN CHILDHOOD LYMPHOMAS

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Background: In the treatment follow up of childhood lymphomas FDG PET-CT is widely used as the most suitable method to assess the tumour viability. The MRI DWIBS (diffusion-weighted whole-body imaging with background body-signal suppression) is a new method without radiation, which is — based on the literature — also reliably determines the viability, but its sensitivity and specificity in childhood lymphomas are unknown yet. The aim of this study is the comparison of the two methods, and determination of the role of DWIBS in childhood lymphomas.

Material and methods: In our prospective study we have investigated 7 children with Hodgkin's (HD) and 8 with non-Hodgkin's (NHL) lymphomas. 26 pairs (12 HD and 14 NHL) of comparative PET-CT and MRI DWIBS examinations were performed. The average ages of the patients at the diagnosis were 13 years with HD and 9 years with NHL. Average time between MRI and PET-CT was 4.1 (0–19) days. The imaging results were compared clinical follow up and/or biopsy results. The data processing was based on medical records and on the reports of imaging procedures. In case of uncertain results we reevaluated the MRI and PET-CT images.

Results: In HD the results of the 12 MRI and PET-CT examinations correlated well in terms of morphology and viability. In 6/12 cases however, both examination methods showed lymph node regions with FDG-uptake or reduced diffusion without any proven viable tumor. All clinically positive tumors were confirmed by both imaging methods. In the NHL patient group, among the 14 PET-CT and MRI comparative examinations in 3/14 cases the relapse was clinically confirmed, but in 2 cases (which were two relapses of the same patient) MRI gave negative result. In 1/14 interim examinations MRI was positive, while PET-CT negative, but following further additional treatments no viable tumor could be found. In case of 10/14 examinations, although the patients were in remission clinically, in only 4 cases could be supported this by both examinations. From the remaining 6 cases in 4 and 3 cases positivity was found by PET-CT and MRI, respectively.

E3

18F-FDG PET/CT IN THERAPY RESPONSE ASSESSMENT OF BONE-DOMINANT BREAST CANCER

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Background: In patients with disseminated breast cancer malignant bone involvement occurs in approximately 70%. Conventional imaging methods, including bone scintigraphy, are highly sensitive for detecting bone me-

tastasis, although they have limited accuracy in assessment of response to therapy. There is no established standard method for monitoring bone metastases. Recent data suggest the promising performance of 18F-FDG PET/CT (PET/CT) for this purpose. Our aim was to retrospectively determine the prognostic value of sequential PET/CT in monitoring systemic therapy of bone-dominant metastatic (BDM) breast cancer.

Material and methods: Retrospective search of our image database identified 23 breast cancer patients with BDM disease, who underwent treatment and had serial PET/CT studies. In this patient group altogether 32 pairs (baseline and follow-up) of PET/CT imaging datasets were reviewed by two experienced specialists. For quantitative analysis the most FDG avid metastasis was defined as target lesion, in accordance with PERCIST criteria. Therapeutic responses were visually classified into four categories: complete and partial metabolic response (CMR, PMR), stable and progressive disease (SMD, PMD). Target lesion SUV and SUL, maximum and peak values were recorded at each time point. Visual response, target SUV/SUL max/peak on baseline, and the absolute and relative change of quantitative parameters were supposed to be predictive for time-to-progression (TTP), which served as a clinical outcome measure. TTP was clinically established by two oncologists independently from PET results (based on other imaging results, tumor markers, and symptomatic findings). The median follow-up time was 230 days.

Results: Forward stepwise Cox regression analysis was used to test for associations between TTP and both dichotomous and continuous variables. Percentage change in SULpeak ($p = 0.001$), initial SULmax ($p = 0.012$) and SULpeak ($p = 0.030$) were most significantly correlated with the outcome. On Kaplan-Meier analysis the survivor curves of four visual and PERCIST response groups were shown to differ. Responders (CMR + PMR) had significantly longer TTP compared to patients with PMD ($p = 0.02$).

Conclusion: Our retrospective study indicates that PET/CT might have a role in therapy response assessment of BDM breast cancer. Qualitative (visual) evaluation and SUL (rather than SUV) based quantification, as proposed by PERCIST, is feasible to apply when considering a prospective trial to validate these findings.

E4

COMPARING THE DIFFERENTIAL DIAGNOSTIC VALUE OF HYBRID IMAGING TECHNIQUES (SPECT/CT, PET/CT) IN BONE LESIONS

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Background: The purpose of our study is to compare the diagnostic efficacy of 99Tc-MDP bone scintigraphy completed by SPECT/CT and the 18F-FDG PET/CT examinations in evaluation of bone metastases.

Material and methods: Due to the collaboration of two departments we have an opportunity to compare the results of patients who underwent the oncological evaluation program including 99Tc-MDP bone scintigraphy completed by SPECT/CT and the 18F-FDG PET/CT examinations.

Results: We diagnosed with SPECT/CT in 48% of patients some type of benign lesions (degenerative disease, traumatic injury or consequence of operation). In the cases of these patients the results of 18F-FDG PET/CT in the whole bone system concerning the bone metastasis were negative as well. Furthermore bone metastases were found in 22% of patients with the SPECT/CT and PET/CT, too. In the 30% of the patients the results of above mentioned between the two different methods were not concordant.

Conclusions: The 99Tc-MDP bone scintigraphy completed by SPECT/CT can particularly improve the detection of the exact etiology of lesions. The diagnostic value of these two different methods have a good correlation. The possible deviation can be caused by using different mechanisms to detect the pathologic lesions: 99Tc-MDP bone scintigraphy represents the phosphate metabolism while the 18F-FDG PET detects the glucose metabolism and the increased activation of osteoblasts are not always accompanied by increased glucose metabolism.

E5

IMPORTANCE OF FDG PET-CT IN DIAGNOSIS AND FOLLOW-UP OF PATIENTS WITH BREAST CANCER

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Background: Our aim was to define extra information of FDG PET-CT examination comparing to the previous diagnostic images; to evaluate the percentage of confirmation of clinically supposed status and to define its influence on oncologic treatment of patients.

Material and methods: The medical records of 143 consecutive patients with breast cancer referred from three oncologic centers from October 2008 to September 2009 were retrospectively reviewed. PET-CT imaging was performed with GE Discovery ST scanner according to the usual protocol. 143 patients (142 women, 1 man, mean age 56.9 years) have 155 breast tumors. The histologic subtypes of the primary tumors were infiltrating ductal carcinoma in 102, infiltrating lobular carcinoma in 18, DCIS alone in 9, other/unknown in 26 cases. Histologically Grade 2 carcinoma occurred in largest proportion. 70 conservative operations and 74 mastectomies were performed. In remainder cases the operation was not performed or type of surgical procedure was not known.

Results: Definite diagnosis was established in 129 cases (84.3%), the extent of disease was increased in 40 (31%), diagnosis was unchanged in 24 cases (18.6%), it was negative in 65 cases (50%). The PET-CT result was equivocal in 24 cases (15.6%) having caused partly inadequate referral, partly difficulty of differentiation between tumor and inflammation. PET-CT examination gave excess information for physicians in 31%. The therapy was altered in 40 cases (26%) based on PET-CT result.

Conclusion: FDG PET-CT examination is useful in management of patients with breast cancer in case of adequate indication.

E6

FDG PET-CT IN MANTLE CELL LYMPHOMA

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Background: We assessed the potential role of PET-CT in the diagnostic workup of mantle cell lymphoma, which type of lymphoproliferative disease unites the unfavourable characteristics of aggressive and indolent lymphomas.

Material and methods: 122 PET-CT examinations of 56 patients were retrospectively analysed [11 pre-treatment, 17 interim, 20 restaging, 14 pre-, 23 post-Haemopoietic Stem Cell Transplantation (HSCT) evaluations, and 37 PET-CT examinations due to clinically suspected relapse].

Results: 9/11 staging examinations before initial therapy had revealed pathologic FDG accumulating focuses. Among the interim examinations (17) only 6 patients achieved complete metabolic remission (CMR), in 11 cases FDG-avid lesions were found. Among the 10/20 restaging PET-CT examinations indicating CMR, 4 patients relapsed within 1 year. Among the examinations showing CMR on the pre-transplantation PET-CT (9/14), relapse evolved in 1 case in the first year after transplantation. In 1 of 23 examinations CMR was not achieved after HSCT, from the 21 of 23 cases showing CMR on post-HSCT PET-CT, 2 patients relapsed within 1 year. In 1 of 23 post-transplantation examinations clinical signs of relapse did not develop after positive PET-CT. Clinical relapse suspicion was confirmed by PET-CT in 13 cases, in 5 of 37 cases it was found to be false positive, in the remaining patients relapse did not evolve after negative PET-CT (19/37).

Conclusion: FDG PET-CT seems to be an accurate method in the diagnostic workup of mantle cell lymphoma, including pre-treatment staging, interim,