578 RESIDUAL MASS ASSESSMENT IN LYMPHOMA POST CHEMOTHERAPY – HISTOLOGY AS A PREDICTOR OF THE 18-FDG PET/CT RESULT

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Introduction: 18-FDG PET/CT is an important tool for the assessment of patients with lymphoma who have residual masses on MDCT after chemotherapy.

Method: We retrospectively analysed the 18-FDG/PET results of 42 patients with residual masses on the end of treatment MDCT.

Results: 42 patients (Hodgkin's lymphoma HL=21, NHL=21) were included in the analysis. Of 21 patients with HL, 17 showed a good response and were in partial remission (PR) by RECIST/WHO criteria by the end of chemotherapy MDCT. The residual masses in all of these patients were metabolically inactive on 18-FDG PET/CT irrespective of initial stage and tumour bulk or size of the residuum. The remaining 4 patients progressed during their initial chemotherapy and showed uptake on 18-FDG PET/CT. In 21 patients with NHL, 20 showed a good response and were in PR by the end of chemotherapy MDCT. The residual masses in 8 showed increased uptake and in 3 low-grade uptake, i.e. over half (55%) of patients had residual disease activity. One patient had progressed on treatment and showed metabolic activity on 18-FDG PET/CT. The remaining 10 patients with NHL showed no residual activity. Size of the residuum or the histological subtype in NHL did not predict metabolic activity on 18-FDG PET/CT but all patients with primary extra-nodal disease (n=3) showed residual metabolic activity. The difference between HL and NHL was significant (p=0.0002)

	PR on CT	CR on PET/CT	PR on PET
HL (n=17)	17	17	0
NHL (n=20)	20	9	11
Σ	37	26	11

Discussion: In our cohort the attainment of PR on MDCT in patients with HL at the end of treatment predicted a metabolic CR on 18-FDG PET/CT. In contrast, in NHL patients in PR on MDCT more than half (55%) showed residual metabolic activity. This suggests HL or NHL biology is a hitherto unrecognized predictor of PET residual mass findings post chemotherapy. Therefore PET may be an important residual mass assessment tool in NHL in particular. This finding should be verified in a larger prospective study.

579 IS EARLY INTENSIFICATION USEFUL FOR PET2+ HL PATIENTS?

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Introduction: Forty pts with Hodgkin Lymphoma (HL) and a PET2+, coming from different Italian Hematologic centres, were analyzed retrospectively, to evaluate the outcome according to Time to Treatment.

Material and methods: Patients' characteristics: 16 M and 24 F, median age 37 yrs (range 20-77); Hystological types: 32 pts SN, 5 pts MC, 1 pt classical type, 1 pt LP and 1 pt PTS; 10 stage I-IIA and30 stage IIB-IV; 19 pts had bulky disease. 9 pts (22%) have already undergone ASCT during 1st line or immediately after its end (''early'') and 5 pts (12%) will undergo ''early'' ASCT for presence of active disease documented by PET2+. 9 pts (22%) underwent ASCT after at least 3 months from the end of therapy; 17 pts (44%) did not receive any intensification of therapy because they were either in CR (10 pts, 59%) at the end of 1st line therapy, or too old (2 pts, 12%), or were treated with 2nd line therapy (3 pts, 17%), or received no further therapy at all (2 pts, 12%).

Results: all the 9 pts (status at transplant: 6 pts PR, 2 pts PD and 1 pt NR) who have already received ''early'' ASCT are alive and 6/9 (66%) are in CR, 3/9 (34%) are in PD. 9 pts were transplanted as salvage therapy: 2/9 (22%) are in CR, 1/9 (11%) is in PR, 1/9 (11%) is in MR, 2/9 (22%) are in PD, 3/9 (34%) died in PD. The 17 pts who did not have an intensification of therapy are alive: 13/17 are in CR (76%), 1/17 (6%) is in PR, 3/17 (18%) are in PD. The characteristics of the three groups of pts were homogeneous in terms of clinical features and risk factors.

Conclusions: our preliminary data suggest that the ''early'' transplant has an advantage in terms of achievement of remission. We will need a large randomized study to determine if ''early'' ASCT is really mandatory for all pts with PET2+.

580 THE ROLE OF FDG-PET IN UNCOMMON NON-HODGKINS LYMPHOMAS (NHL)

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Objectives: Published literature regarding PET imaging in uncommon NHL subtypes (i.e. not diffuse large B-cell lymphoma or follicular lymphoma) is limited. We present our experience of PET for T-cell NHL, CLL/SLL, mantle cell lymphoma (MCL), marginal zone lymphoma (MZL), and lymphoplasmacytic lymphoma (LPL).

Methods: Subjects with a diagnosis of uncommon NHL who underwent PET imaging at our institution between 2000 and 2007 were retrospectively identified. Subjects were eligible if they were newly diagnosed or recently relapsed and had images and clinical data available for review. Subjects were excluded if they received treatment within 6 months prior to the scan, or if relapse was not documented by biopsy or other imaging modality. Scans were interpreted as positive, negative, or indeterminate by an independent nuclear medicine physician using the recent Consensus Imaging Subcommittee Criteria (Juweid *et al.*, JCO 2007).

Results: PET were available for 65 subjects. Sensitivity of PET and mean highest SUVmax by NHL subtype are shown below. PET was extremely sensitive for MCL, regardless of location; conversely, PET was only positive 62% of the time in CLL (p=0.008 for MCL vs. CLL) at a significantly lower average SUVmax. The most common locations of false negative or indeterminate results were stomach and colon.

Conclusions: PET has high sensitivity in specific uncommon subtypes, such as MCL, and should be explored for disease staging and response assessment. PET may be valuable in distinguishing MCL from CLL.

Histology (N)	Negative/ Indeterm.	Positive (%)	Mean SUVmax
T-cell NHL (11)	3/0	8 (73%)	14
CLL/SLL (13)	2/3	8 (62%)	4.2
MCL (18)	0/0	18 (100%)	6.5
MZL (21)	5/2	14 (67%)	4.5
LPL (2)	0/0	2 (100%)	3.7

581 RESPONSE ASSESSMENT IN AGGRESSIVE NON HODGKIN LYMPHOMA DISEASE: PREDICTIVE VALUE OF MID-TREATMENT EVALUATION BY 18-FDG-POSITRON EMISSION TOMOGRAPHY/ COMPUTED TOMOGRAPHY (PET)

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Introduction: The PET is used in staging and restaging of aggressive NHL pts. We introduced PET scan also in the mid-treatment evaluation (PET-2) to test chemosensitivity and response in these pts.

Patients and methods: From 05/05 to 12/07 36 aggressive NHL pts were evaluated: median age 50 (21-78); 28 DLBCL, 1 anaplastic, 3 mantle cell and 4 follicular grade IIIb NHL. Most of pts were in advanced disease with an unfavourable IPI and 12/36 bulky disease. The treatment plans were: 6-8 RCHOP-like (RCHOP) in 16 and HDC+ASCT in 20 pts respectively. All pts were staged with standard procedures and PET at the diagnosis and at the end of therapy. After 2-4 RCHOP PET-2 was planned in all pts.

Results: PET-2 demonstrated: 27/36 pts negative and 9/36 pts positive. The standard and PET restaging at the end of therapy were 30/36 negative and 6/36 positive. Among the 27 pts PET-2 negative, 20/27 remained negative at the final PET and achieved CR, 7/27 became positive with PD. Among the 9 pts PET-2 positive, 6/9 became negative with CR. The other 3/9 pts remained positive at the end of therapy with 1 PD, 1PR and 1 false positive (FP) (parotid gland carcinoma without NHL involvement). The

treatment plan did not influenced PET results: in RCHOP pts 13/16 were PET-2 negative with final 9 CR and 4 NR and 3/16 were PET-2 positive with final 1 NR, 1 PR and 1 FP; in HDC+ASCT pts 14/20 were PET-2 negative with final 11 CR and 3 NR and 6/20 were PET-2 positive with a final CR for all of them. With a median FU of 18 months OS was 89% in PET-2 negative and PET-2 positive pts and FFS was 74% in PET-2 negative pts and 89% in PET-2 positive pts respectively.

Conclusions: The PET is important for staging and restaging in NHL pts to define CR pts. In HD pts early PET is a crucial prognostic factor to test chemosensitivity and then to predict outcome. In our study the mid-treatment PET in NHL pts had not so clear predictive value, because pts, even if positive at PET-2, can achieve CR. More large studies are needed to determine the real impact of on course PET in aggressive NHL patients.

582 IMAGE-GUIDED CORE-NEEDLE BIOPSY (CNB) IN THE MANAGEMENT OF PATIENTS WITH NON-HODGKIN'S LYMPHOMA (NHL) AND HODGKIN'S DISEASE (HD)

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Introduction: CNB are useful to the tumor diagnosis. We reported our experience in evaluating the efficacy of CNB in the management of NHL and HD.

Methods: 251 CNB were performed as the diagnostic procedure on 226 patients treated in our institution for a NHL or a HD between 1997 and 2006. This procedure was achieved in 107 cases without previous history of lymphoma, in 139 with suspected recurrence and in 5 as a second procedure after a first inconclusive CNB, and was performed under ultrasound, CT-scan or radioscopy guidance. Specimens were obtained from deep-seated (120) or peripheral lymph nodes (76), limbs (18), chest wall or paravertebral areas (18), head and neck areas (8), breast (7) and bone (4). Standard histology was completed by immunohistochemistry in all cases but 7. The originality of our serie is the achievement of a genetic study in 54 cases (9 as a molecular genetic study on frozen samples and 45 as a cytogenetic analysis on fresh tissue samples).

Results: Diagnosis of lymphoma was achieved in all but one case with no need of surgical biopsy. In 101 patients without previous history of lymphoma, CNB provided sufficient material for the diagnosis. Cytogenetic was informative in 27 cases (conventional analysis in 16, fluorescent in situ hybridization in 11) and permitted to change the initial diagnosis in 1 case. Treatment was initiated solely on the basis of the diagnosis obtained by the CNB as the first procedure in 245 out of 251 cases.

Conclusion: Our data suggest that CNB is a suitable and adequate procedure in lymphoma diagnosis, particularly for patients with previous history of lymphoma when recurrence or histologic progression or transformation is suspected. However at the time of initial diagnosis we recommend the use of CNB only in the absence of peripheral lesions or for patients inappropriate for surgery.

583 PET GUIDED BEACOPP DE-ESCALATION IN ADVANCED HODGKIN LYMPHOMA PATIENTS WITH A GOOD RESPONSE AFTER THE SECOND CHEMOTHERAPY CYCLE

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Background: In the previous summary (ASCO 2007) we demonstrated a superiority of upfront escalated BEACOPP approach as compared to ABVD regimen. The initial choice of chemotherapy was based on doctor's advice and patient's preferal, poorly responding patients received escalated BEACOPP for the next 3 cycles, while good responders – ABVD.

Methods: We present an upgrade of the patients treated with upfront escalated BEACOPP (n=78). Early response was assessed by imaging studies after the first two cycles: CT (n=48) and PET-CT (n=30). PET-CT assessed patients had additional scans at diagnosis, and at the end of therapy.

Results: The EFS and OS in the whole group is satisfactory. OS for 2 years observation is 96.1% and EFS 89.7%. De-escalation of therapy was possible in 66% of PET-CT assessed patients and 39% after CT based assessment. None of the patients de-escalated after the early PET-CT was resistant to further ABVD therapy, while 4 resistances and 4 early relapses (with 3 subseqent deaths) were observed in a CT assessed group. There are no late relapses observed so far, however a PET-CT assessed patients have a shorter follow-up (average of 2 years), compared to CT assessed cases (average 3 years).

Conclusions: 1. Escalated BEACOPP regimen is an upfront standard therapy for advanced HD patients. 2. De-escalation of upfront therapy does not impair its efficiency in good responders. 3. PET-CT used as an early response assessment identifying good responders is more specific and accurate to CT scan.

584 EVALUATION OF ORGAN INVOLVEMENTS IN INTRAVASCULAR LARGE B-CELL LYMPHOMA BY ^{18}F-FLUORODEOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY

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Background: ^{18}F-fluorodeoxyglucose positron emission tomography (FDG-PET) has recently evaluated as an essential imaging tool for assessment of patients with diffuse large B-cell lymphoma (DLBCL). But it is unknown the usefulness of FDG-PET for initial assessment in intravascular large B-cell lymphoma (IVLBCL) as a subtype of DLBCL.

Patients and Methods: To evaluate diagnostic accuracy of FDG-PET in IVLBCL, we retrospectively analyzed 4 consecutive IVLBCL patients between May 2006 and November 2007. Patients were 2 male and 2 female (median age, 62 years; range, 54-76 years). All the patients received bone marrow (BM) biopsies and random skin biopsies, and 2 of 4 patients received renal biopsy. FDG-PET scan was performed to evaluate them before the beginning of their treatment. We compared FDG-PET image with results of pathological findings with respect to the detection in organ involvements.

Results: In the pathological specimens, BM and skin involvements were detected in 3 and 2 patients, respectively. Two patients who received renal biopsy were detected the disease involvement. Accumulation of FDG in bone was observed in 3 of 4 patients. Meanwhile, no patient revealed the renal and skin accumulation. The highest standardized uptake value was addressed up to 8-14 in the diffuse bone accumulation. By comparing results of pathological findings, we could accurately detect the BM involvements in 2 of 4 patients by FDG-PET. The other 2 patients revealed false-negative and false-positive findings in BM involvements, respectively. One patient with false-negative FDG-PET result had fewer lymphoma cells in the bone marrow specimen compared with patient with concordant FDG-PET result. We could not detect the renal and skin involvement by FDG-PET imaging regardless of the positive pathological findings.

Conclusion: Our study suggested that the efficacy of FDG-PET for initial assessment in IVLBCL was inferior to that in DLBCL.

585 THE MAXIMUM STANDARD UPTAKE VALUE (SUVMAX) OF PET/CT CORRELATES WITH LYMPHOMA AGGRESSIVITY

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Introduction/Background: Fluorodeoxyglucose Positron Emission Tomography (FDG PET/CT) is becoming a useful tool for staging lymphomas and evaluating treatment response. FDG PET/CT has been designed for detecting foci of increased glucolysis, which are known to be a typical sign of tumor metabolism. However, the correlation between uptake and histology, or even the aggressivity of lymphoma is not clear.

Material and Methods: A retrospective review of 69 patients with lymphoma and FDG PET/CT study at the time of diagnosis from April 2005 to October 2007 has been performed. PET images were evaluated qualitatively for regions of focally increased glucose metabolism, as well as semiquantitatively by determining standard uptake values. The Maximum Standard Uptake Value (SUVmax) of this initial diagnostic study was evaluated.

Results: Lymphomas were classified in two groups: indolent lymphomas (including: lymphocytic, lymphoplasmacytic, MALT, follicular and Hodgkin lymphoma) n=38 and aggressive NHL (including lymphoblastic, large B-cell, anaplastic and peripheral T-cell) n=31. The median SUVmax for the group of indolent lymphomas was 10.29, and 17.85 for the group of aggressive NHL ($p<0.01$). A subgroup analysis between indolent non Hodgkin lymphomas and Hodgkin lymphoma did not show significant differences in median SUVmax ($p=0.8$).

Conclusions: Aggressive lymphomas have higher uptake and SUVmax in comparison with indolent lymphomas. More investigations with larger series are needed to determine the relation between the subtype of the Lymphoma and its relation with SUVmax.

586 PET-CT F18-FDG VS CT FOR EVALUATION OF RESPONDING THERAPY LYMPHOMA: OUR EXPERIENCE

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Aim of the study: Positron emission tomography (PET)/computed tomography (CT) with $F^{18}(F^{18}$-FDG-CT-PET) has become routine in evaluating patients with Hodgkin Lymphoma (HL) and Non Hodgkin Lymphoma (LNH) because is more sensitive in assessing for viable tumour in both nodal and extra nodal sites, with sensitivities ranging from 72% to 100%. We were interested to evaluate the impact of this nuclear technique to detect, in patients who have undergone therapy, the residual neoplastic tissue at sites of previously active disease.

Materials and Methods: From October 2005 to December 2007 we studied 54 patients (22 female, 30 male; age range 26-79) with HL/NHL. In total we performed 74 scans; each patient fasted for 6 hours and then was injected with 4.0 MBq/kg bodyweight of F18-FDG. 60 minutes later image acquisition was performed using a dedicated PET/CT tomography (Discovery STE-GE Medical System, 3D acquisition system), 54 patients were studied in pre-treatment staging (11 newly diagnosed lymphoma) and all patients for post therapy response assessment (3 during therapy for early respond assessment, and 10 patients performed already the third follow up evaluation). All patients underwent CT at staging and post-therapy; 32 patients received chemotherapy (CHT) and radiotherapy (RT), 4 patients RT only, 18 patient only CHT.

Results: in 15 patients (27%) PET-TC post therapy evalutation, showed a partial resolution of disease concordant with CT results; in 28 patients (51%), that showed onPET-CT evaluation completed resolution of disease, CT only showed 27 cases of RC; on the other hand, in the others 11 patients (20%) PET-TC F^{18}-FDG evaluation evidenced a progressing disease, showing more sites of involvementsthan CT evaluation. In 11 (20%) patients, the PET-CT post-treatment evaluation, modified the therapy planning.

Conclusion: In our preliminary data, FDG-18 PET-CT has shown to be a relevant non invasive method of staging and follow up of lymphoma and was superior compared with CT in nodal evaluation and detection of nodal and extra nodal disease especially at the end of first line therapy.

587 ROLE OF TOTAL BODY MAGNETIC RESONANCE IN DETECTING LYMPHOMA SKELETAL INVOLVEMENT

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Introduction: Skeletal involvement is reported in approximately 10-20% of lymphomas. Computed tomography (CT) and positron emission tomography (PET) are routinely used forlymphoma staging but possibly underestimate skeletal disease. Total body magnetic resonance (MR) may add useful information about lymphoma osseous localizations and in this study was compared with conventional imaging procedures.

Materials and methods: Five Hodgkin lymphoma and 10 diffuse large B cell lymphoma patients with clinical or radiological signs suggesting skeletal involvement underwent total body MR in addiction to CT and PET. Total body MR was performed with a body coil (1.5 Tesla) and images were obtained by using fast spin-echo (FSE) short time inversion recovery (STIR) and spin-echo single-shot (SE-EPI-SSH) sequences diffusion weighted. Twenty-one MRs were performed, 12 at diagnosis and 9 at restaging.

Results: Skeletal involvement was detected by MR in all cases at diagnosis (12/12), while CT was negative for bone lesions in 9/12 cases, showing a low sensitivity (25%); when positive (3/12), CT detected a lower number of osseous localizations than MR. PET at diagnosis resultedpositive in 86% of cases but identified a minor extension of bone involvement than MR in all cases but one. At restaging MR was negative for skeletal lesions in 7/9 cases, accordingly to CT and PET. In MR positive patients (2/9), PET was negative in one case, while in the other detected less sites of bone disease.

Discussion: These data suggest that total body MR can play a role in patients affected by lymphoma with suspected skeletal involvement. FSE-STIR and SE-EPI-SSH sequences diffusion weighted can accurately detect and characterize the hyper-intensity of lymphoma bone lesions. On the contrary, CT sensitivity for skeletal involvement resulted very low; it derives that the evaluation of bone localizations by CT alone is suboptimal, possibly resulting in patients' under-treatment. PET findings regarding skeletal involvement are often concordant with total body MR, but a lower number of bone lesions is detected in the majority of cases.

588 THE CAUSE OF "SPONTANEOUS REGRESSION" OF MALIGNANT LYMPHOMA, MAY BE DUE TO THE RADIOLOGICAL EXAMINATION

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Introduction: It is generally said that the cause of 'spontaneous regression' of malignant lymphoma is unknown. However, we believe that the cause may be due to the radiological examination, by analyzing the following cases.

Cases: The first case was a 69 y.o. female who had a hard swollen right thyroid lobe. The fine needle aspiration biopsy diagnosis was Hashimoto's disease, though the tumor macroscopically seemed to be a malignant neoplasm. To confirm the diagnosis, many radiological examinations ie: ^{131}I scintigraphy, CT, Soft X-ray, and X-tomography were performed. Then, the swollen thyroid lobe became reduced in size to about half within a month. There appears to be no other explanation, except that the many radiological examinations themselves reduced the tumor. Malignant lymphoma was suspected because of its high radiosensitivity. The resected thyroid revealed malignant lymphoma, which met our expectations. A fibrosis was found microscopically, which suggested the effect of radiation. Subsequently, 5 similar malignant lymphoma cases with 'spontaneous regression' were observed. Similar findings were written about in the literature on regression occurring after radiological examination. In addition, 'spontaneous regression' seemed to occur under the following circumstances: when the tumor is in the initial stage, a radiation dose larger than a CT is given, and then several weeks of observation time without chemotherapy or other treatment is necessary.

Discussion: Patients who have an extremely radio-sensitive lymphoma may rarely appear among numerous malignant lymphoma patients, and these rare patients lymphoma is then reduced by a small dose of radiation from radiological examination. The hypothesis can explain several questions about 'spontaneous regression' of malignant lymphoma. For example, the reason why the 'spontaneous regression' occurred completely or incompletely is that radiated doses were enough or not enough. Why the 'spontaneous regression' occurred partially in some multiple tumor cases is the tumors were partially radiated. The hypothesis can be adapted to the 'spontaneous regression' of cancer as well.

Conclusion: The cause of 'spontaneous regression' of malignant lymphoma may be the radiological examination itself.