

“focus on...” session: PET

122 FLUORINE-18 FLUORODEOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY IN MATURE T-CELL AND NATURAL KILLER CELL MALIGNANCIES

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Introduction: Fluorine-18 fluorodeoxyglucose (FDG)-positron emission tomography (PET) is useful in Hodgkin and B-cell lymphomas for staging, prognosis and response assessment. We evaluated its role in 30 cases of mature T-cell and NK-cell lymphoma (T/NK NHL).

Materials and methods: Cases were studied at diagnosis (n=19), progression (n=6) and relapse (n=5) with whole body PET-CT (Discovery VCT; 64-MSCT, GE Healthcare, U.S.A.). Results were correlated with lactate dehydrogenase (LDH) and circulating Epstein Barr virus (EBV) DNA levels.

Results: There were 24 men and 6 women (median age 48, 17/79 years). They included nasal NK-cell lymphoma (nasal=10, extranasal=2), angioimmunoblastic T-cell lymphoma (AILT, n=7), anaplastic large cell lymphoma (ALCL, systemic=3; cutaneous=1), peripheral T-cell lymphoma, unspecified (PTCL-U, n=4), mycosis fungoides (MF, n=2) and T-cell large granular lymphocytic (T-LGL) leukaemia (n=1). All NK-cell lymphomas were intensely FDG-avid (mean SUVmax: 8, 6.9 - 10.0) in both nasal (n=10) and extra-nasal sites (n=5, 12 sites). The nasal FDG-avid tumor was more localized than that on CT. Two patients had PET-ve marrow infiltration shown by EBER-ISH. All cases of AILT, PTCL-U and systemic ALCL showed avid FDG uptake. In 5 cases, subcentimeter lymph nodes were FDG-avid and 1 PTCL-U showed occult marrow infiltration by PET. The T-LGL and cutaneous ALCL were both PET-ve, while two cases of MF showed low uptake. Analysis on 26 patients treated with curative intent showed that age, LDH and advanced stage (III/IV) correlated with remission status (p=0.044, 0.029, 0.03 respectively) and survival (p=0.041, 0.002 and 0.031 respectively). The PET SUVmax had no prognostic impact. In 12 NK-cell lymphomas, EBV DNA correlated to LDH (r=0.774, p=0.003), but both were unrelated to SUVmax.

Discussion: PET-CT is a sensitive staging method for both nodal and extranodal aggressive T/NK NHL. For low grade and cutaneous disease, disease detection may be lower. Although isolated SUVmax levels may not be useful, the value of total lesion glycolysis analysis needs further evaluation.

123 18F-FLUORODEOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY (18F-FDG-PET) IN PATIENTS WITH LYMPHOMA OF THE GASTROINTESTINAL TRACT ACCORDING TO THE WHO-CLASSIFICATION: THE VIENNA UNIVERSITY EXPERIENCE

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Background: The gastrointestinal (GI) tract is the most common site of origin for extranodal lymphomas, which tend to occur in a multifocal fashion irrespective of histology. Thus, extensive staging of such patients is mandatory, which is difficult to obtain in the GI-tract.

Aims: To study the ability of 18F-fluorodeoxy-glucose positron emission tomography (18F-FDG-PET) to visualize tumor burden in patients with primary GI-lymphoma with respect to the histologic subtypes outlined in the WHO classification of lymphoid neoplasms.

Methods: Patients with a diagnosis of GI-lymphoma undergoing 18F-FDG-PET at our institution were analysed. 18F-FDG-PET results were compared to conventional radiologic, endoscopic and histologic findings and analysed with respect to the histologic subtype of the lymphoma.

Results: A total of 61 patients with primary GI-lymphoma (18 with MALT lymphoma, 13 with mantle cell lymphoma - MCL, 12 with duodenal follicular lymphoma - FL, 10 patients with gastric diffuse large B-cell lymphoma - DLBCL and 8 with enteropathy-associated T-cell lymphoma - EATL) underwent 18F-FDG-PET. No focal tracer uptake was seen in patients with MALT-lymphoma and FL, while 12/13 patients with MCL and 7/8 cases with EATL were positive, and good correlation with conventional imaging was found. In addition, all 7 cases of gastric DLBCL, but none of the 3 DLBCL cases with transformation from MALT lymphoma were positive.

Conclusion: According to this largest series so far, 18F-FDG-PET is a useful imaging method in GI-MCL, EATL and DLBCL and allows for estimation of tumour burden, while it does not visualize primary intestinal FL and MALT-lymphoma, even after transformation.

124 FDG-PET DURING FOLLOW-UP IN PATIENTS WITH HODGKIN LYMPHOMA AFTER FIRST LINE THERAPY

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Background: PET is recommended for response assessment during therapy in Hodgkin lymphoma (HL), however the role of routine PET in follow-up after treatment is still controversial.

Material and methods: This retrospective study evaluated PET findings in 95 patients (pts) treated for HL during the long-term follow-up after first line therapy. 54 pts received chemotherapy and irradiation, 40 pts were treated with chemotherapy alone and 1 pt with radiotherapy alone. Median follow-up of the group since the end of therapy until December 2007 was 34 (range 3-103) months.

Results: 311 PET examinations were evaluated in 95 pts (mean 3 PET scans per patient). 93 out of 95 pts are alive, 2 (2,1%) pts died (1lymphoma progression, 1treatment toxicity). At the end of therapy 80 (84,2%) pts were PET negative and 15 (15,8%) pts PET positive. During the long-term follow-up 55/80 pts had sustained complete remission with negative PET scans and in 25/80 pts new PET positivity occurred: 14/25 had transient nonspecific positivity - 4 biopsy proven: inflammation and hip osteonecrosis. None of these 14 pts relapsed. In 11/25 pts biopsy confirmed tumor: 9 relapses of HL, 1 follicular lymphoma and 1 pulmonary adenocarcinoma. In the group of 15/95 (15,8%) pts with positive PET at the end of first line therapy primary progressive HL was diagnosed in 5/15 pts and 10/15 pts had transient nonspecific PET positivity without a relapse - 2 biopsy proven: inflammation, thymus hyperplasia, postradiation and postchemotherapeutic changes.

Conclusion. In our retrospective study we observed high ratio of false positive PET results (25,3%) during the long-term follow-up and these data do not support routine posttreatment surveillance.

125 MULTIVARIATE ANALYSIS OF PATIENTS WITH HODGKIN LYMPHOMA TRANSPLANTED WITH PET-AVID DISEASE

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Introduction/Background: A number of groups including the lymphoma service at MSKCC previously reported that normalization of functional imaging (FI) pre-ASCT with salvage chemotherapy (ST) predicts for a favorable outcome in patients (pts) with relapsed and refractory Hodgkin lymphoma (HL). However, a proportion of pts with persistent FI-avid disease can still achieve prolonged PFS with high dose chemoradiotherapy (HDT). We also reported that three pre-ST risk factors (RF): remission duration (RD) < 1yr., B symptoms, and extranodal disease (EN) predicted for PFS (Blood 2001, 97:616-623). Pts with 0-1 RF were good risk (GR) and those with 2-3 RF are poor risk (PR). Our aim was to determine which pts with chemosensitive, but persistent FI-avid HL, pre-ASCT, benefit from HDT.

Material and Methods: From 1994-2006, two-hundred and twenty-three HL pts were transplanted on research protocols; all pts received ICE-based ST and had responding disease on CT imaging, however 77 pts had persistent FI-avid HL at the time of HDT. The median age was 31 and 57% were male. Pre-treatment characteristics were bulky (5 cm) nodal mass (53%), RD < 1 yr.-78%, EN-68%, B symptoms-42%, GR disease-27%, PR disease-73%, and radiation naïve-44%. Of the FI scans, 74% had a PET and 26% had a gallium scan; data is combined since the type of FI was not significant (p= 0.98). Univariate and multivariate analyses were performed to predict for PFS and overall survival (OS).

Results: At a median follow-up of 4 years, the Kaplan-Meier estimates for OS and PFS are 56.1% (95% CI, 43.1 - 67.2%) and 39.8% (95% CI, 28.2 - 51.2%) respectively. Multivariate analysis based on Cox proportional hazards model indicated pts with non-bulky disease, and those with GR had more favorable outcomes (PFS of 50.6% and 56.8% respectively) vs. those with bulky or PR disease (PFS of 30.4% and 33.2% respectively).

Variable	Hazard Ratio	P-value
Bulky (>5 cm vs. <5 cm)	2.002	0.026
PR vs GR (2-3 vs 0-1) RF	2.502	0.016

Conclusion: Our data suggests that despite pre-ASCT FI-avid HL, 40% of pts are curable with HDT; those with bulky nodal involvement or at least two of the following RF: RD <1yr, EN or B symptoms have an inferior outcome. Our current phase II trials address these pt populations by 1) administering additional non-cross resistant chemotherapy after ICE-based ST, with the goal of normalizing the PET scan pre-ASCT; 2) the use of non-myeloablative allotransplants to pts with persistent PET-avid PR disease despite the aforementioned protracted course of ST.

126 FDG-PET SCAN GUIDED CONSOLIDATIVE RADIATION THERAPY MAY IMPROVE OUTCOME IN PATIENTS WITH ADVANCED-STAGE AGGRESSIVE NHL WITH RESIDUAL ABNORMALITIES ON CT SCAN FOLLOWING CHEMOTHERAPY

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Background: Although many patients with aggressive NHL can be cured with anthracycline-based therapy, residual abnormalities of uncertain significance are

frequently seen on post-therapy CT scans. The value of consolidative radiation therapy (XRT) is unknown. FDG-PET scanning may allow for the discriminate use of XRT to eradicate sites of residual disease.

Patients: Since 2004, patients with advanced-stage aggressive NHL in British Columbia (BC) have been treated with a systematic policy that recommends a post-therapy PET scan for pts with residual abnormalities ≥2 cm on CT scan, followed by XRT to sites amenable to radiation. Results of the first 120 patients assessed with PET scan are presented. Pt characteristics are as follows: median age 60 y (range 18-89); 64% male; 53% stage III/IV; 44% PS>1; 26% >1 extranodal site; 59% elevated LDH; 53% bulky site >10 cm; 57% IPI 0-2, 43% IPI 3-5. Histology: DLBCL 87, PMBCL 24, ALCL 2, PTCL 1, intermed B-cell NOS 6. All pts received CHOP(+R if B-cell) with curative intent. Median follow-up is 23 mos (range 4-45).

Results: 53/120 (44%) had a positive post-therapy PET (PET-Pos), 65/120 (54%) had a negative PET (PET-Neg) and 2 were indeterminate. Median SUV of PET-Pos scans was 3.3 (range 1.8-20.8). No PET-Neg pts received XRT. 39/53 (74%) of PET-Pos pts received XRT (3000-4000 cGy) to sites of PET positivity (solitary site 31, multiple sites 8), with only 4 relapses to date. 14/53 PET-Pos pts did not receive XRT due to: multiple sites not amenable to XRT 8; physician choice 4; biopsy negative 2. The 2-y PFS was similar for PET-Pos pts who received XRT (87%) and PET-Neg pts (81%), and was significantly better than PET-Pos pts who did not receive XRT (40%), p<0.001.

Conclusion: Although longer follow-up is necessary, pts with residual abnormalities on CT who receive consolidative radiation to sites of PET positivity appear to have an outcome similar to pts with a negative post-therapy PET, suggesting a possible benefit for the rational use of PET-guided XRT following chemotherapy for aggressive advanced-stage NHL.