DOI: 10.1007/s00259-021-05547-1

EANM'21

EUROPEAN ASSOCIATION OF NUCLEAR MEDICINE

Annual Congress of the European Association of Nuclear Medicine October 20-23, 2021 Virtual

Abstracts

European Journal of Nuclear Medicine and Molecular Imaging (2021) 48 (Suppl 1): S1–S648

This supplement was not sponsored by outside commercial interests. It was funded entirely by the association's own resources.

concordance-indexes were 0.71 in both sets. In the training set, the group of patients predicted with good prognosis (predicted 1-year PFS probability>0.5) had an observed PFS of 23.7 months versus 3.1 months for patients predicted with poor prognosis (p<0.001). In the external validation set, observed median PFS was "unreached" versus 6.5 months, respectively (p=0.012). Regarding overall survival, medians were "unreached" versus 6.1 months, respectively (p<0.001) in the training set; and "unreached" versus 27.9 months, respectively (p=0.056) in the validation set. **Conclusion:** We developed and externally validated a model to discriminate, at baseline, patients with high against low risk of progression 1 year after initiation of anti-PD-1 therapy, providing an easily usable tool to personalize treatment. **References:** None

OP-1077

Predictive value of baseline [^{18}F]FDG PET/CT for response to systemic therapy in patients with advanced melanoma

V. Liberini[1], R. Mimmo[2], R. Passera[1], E. Califaretti[1], F. Ceci[1], P. Fava[3], M. Rubatto[3], L. Tonella[3], G. Polverari[1,4], S. Ribero[1], M. Bellò[1], V. Arena[4], P. Quaglino[3], D. Deandreis[1];

[1]Nuclear Medicine Unit, Department of Medical Sciences, University of Turin, Turin, ITALY, [2]UNITO - University of Turin, Turin, ITALY, [3]Dermatology Clinic, University of Turin, Turin, ITALY, [4]PET Center, Affidea IRMET, Turin, ITALY.

Aim/Introduction: To evaluate the association between baseline [^{18}F]FDG-PET/CT tumor burden parameters and early (3 months) and late (12 months) disease progression rate after first-line target therapy or immunotherapy in advanced melanoma patients. **Materials and Methods:** 50 advanced melanoma patients that performed baseline [^{18}F]FDG-PET/CT before first-line target therapy (32/50) or immunotherapy (18/50) were retrospectively analyzed. A semi-automatic segmentation was performed by one operator using LifeX. Lesions were detected setting a standardized uptake value (SUV) threshold >2.5 and segmented using a 41%-isocontour volumes of interests (VOIs). Whole-body and per-district (soft tissue, lymph nodes, lung, liver and bone) metabolic tumor volume (MTV) and total lesion glycolysis (TLG) were calculated for each patient. Therapy response was assessed according to RECIST 1.1 criteria on CT scan at 3 (early) and 12 (late) months and classified as follows: complete/partial response and stable disease (responders) and progression (non-responders). PET parameters were compared with Mann-Whitney test for the entire cohort, target therapy (A) and immunotherapy subgroup (B), respectively. Optimal cut-offs for predicting progression were defined using the ROC curve. Results: Fifty patients (F:M=30:20; median age=62y) with advanced melanoma (stage II=1, III=14 and IV=35 pts) were included. 33/50 patients were BRAFV600 mutated. For the entire cohort, MTVwb and TLGwb were 10.6 cm^3 [0-329.5] and 50.75 [0-1732.9], respectively. Soft tissue, lymph nodes, lung, liver and bone metastases were detected in 12/50 (group A:B=9/32:3/18), 31/50 (A:B=22/32:9/18), 17/50 (A:B=5/32:12/18), 3/50 (A:B=2/32:1/18) and 6/50 (A:B=4/32:2/18) patients.For the entire cohort, group A and B, patients were classified as non-responders in 44/50, 30/32 and 14/18 respectively at early evaluation, and in 39/50, 25/32 and 14/18 respectively at late evaluation.Significant differences of metabolic parameters between responders vs non-responder status were found only at late evaluation for MTVwb, TLGwb, MTVbone and TLGbone (all p<0.03) in the entire cohort and in group A and also for MTVlfn and TLGlfn (all p<0.05) in group A. No significant differences were found for group B. At late evaluation, the following optimal cut-off values to separate responders vs non-responder pts have been found: MTVwb=13cm^3 (p=0.03; AUC=0.71, sensitivity=64%, specificity=64%) and TLGwb=53 (p=0.02; AUC=0.73, sensitivity=73%, specificity=60%) for the entire cohort; MTVwb=14cm^3 (p=0.02; AUC=0.81, sensitivity=83%, specificity=69%) and TLGwb=86 (p=0.005; AUC=0.87, sensitivity=83%, specificity=73%) for group A. **Conclusion:** In advanced melanoma higher values of whole-body and bone metabolic parameters were correlated with non-responder outcome, especially in patients treated with target therapy. Baseline [^{18}F]FDG-PET/CT before systemic treatment might be an important tool to predict response to treatment. **References:** None

OP-1078

^{18}F-FDG-PET/CT in the Staging, Follow-up and Treatment Tailoring of Malignant Melanoma - First "Full-Digital" Experience in a Single Instituition

L. Chavdarova[1], I. Gavrilova[2], E. Piperkova[1];

[1]University Specialized Hospital for Active Treatment in Oncology, Clinic of Nuclear Medicine, Sofia, BULGARIA, [2]University Specialized Hospital for Active Treatment in Oncology, Clinic of Dermatooncology, Sofia, BULGARIA.

Aim/Introduction: Contemporary treatment of malignant melanoma (MM) including immune- and targeted approaches leads to an increased need of correct staging and treatment monitoring. Although well known as usually FDG-avid and helpful, there is still no strong evidence for the standard use of FDG-PET/CT in the routine work-up of melanoma. Because of that, the aim of our investigation was the evaluation of diagnostic input of the new generation, full-digital PET/CT scanning for the precise staging and treatment tailoring of MM. **Materials and Methods:** Since the initiation of our "full-digital", newest generation, PET/CT-scanner in the Clinic of Nuclear medicine in June 2020, we collected prospective data from 121 adult patients with MM (53 female, 68 male), with last scan of the assessed series on 15.04.2021. SUVmax, TLG, MTV and number of lesions were calculated where applicable, influence and change in therapy was assessed. If available, the reports were compared

with following histologic results. Results: 121 patients (pts) received at least one (PET-1) scan, 57 negative and 64 positive for pathologic lesions. In 24 pts a second (PET-2) scan was performed in the follow-up (9 negative, 15 positive), one patient received a third (PET-3) (positive) scan. SUVmax ranged from 57,26 in PET-1 to 29,9 in PET-2, to 4,75 in PET-3. Good treatment response was evaluated with decreasing TLG, MTV and number of lesions. PET-1 helped further treatment tailoring in 77 pts - 28 received targeted therapy, 27 received immune check-point inhibitors, 7 - BCG, 9 - radiotherapy, 13- surgery. PET-2 changed further therapy in 15 pts: 8 - target-, 4- immune-, 3- surgery. Histology proved 7 true-positive, 2 true-negative and 2 false-positive (reactive lymph nodes) results. True-negative based on follow-up imaging were 6 studies. PET/CT assessed 9 pts with a second malignancy - 6 in remission, 1 - progressive and 2 newly diagnosed. In single pts PET/CT detected distinctive lesions in the bowels and in the brain. **Conclusion:** FDG-PET/CT is high-promising in the clinical staging and treatment tailoring of MM and should take place in the routine algorithm of this disease. Additional data collection and assessment from our study follows for statistical significance. **References:** None

1911

Wednesday, October 20 - Saturday, October 23, 2021

on-demand pool, release on Wednesday, October 20 at 09:00

TROP Session: Nuclear Medicine Imaging and Therapy in Thyroid and Parathyroid Disorders

OP-1080

Quantitative classification and radiomics of [^{18}F]FDG-PET/CT in indeterminate thyroid nodules

M. Mostert[1,2], E. J. de Koster[3], W. A. Noortman[1,4], L. de Geus-Oei[1,3,4], F. H. van Velden[1], W. J. Oyen[5,6,3], D. Vriens[1];

[1]Leiden University Medical Center, Leiden, NETHERLANDS, [2]Delft University of Technology, Delft, NETHERLANDS, [3]Radboud University Medical Center, Nijmegen, NETHERLANDS, [4]University of Twente, Enschede, NETHERLANDS, [5]Rijnstate Hospital, Arnhem, NETHERLANDS, [6]Humanitas University, Milan, ITALY.

Aim/Introduction: Only 20-30% of thyroid nodules with indeterminate cytology (Bethesda III/IV) are malignant. Although [^{18}F]FDG-PET/CT can rule out malignancy in visually [^{18}F]FDG-negative thyroid nodules, a visually positive [^{18}F]FDG-PET/CT does not differentiate between benign or malignant, requiring surgery to obtain a definite diagnosis. This concerns Hürthle cell nodules in particular, which are almost exclusively strongly [^{18}F]FDG-positive. We evaluated whether quantitative assessment of [^{18}F]FDG-PET/CT, including radiomics and machine learning of [^{18}F]FDG-positive nodules, could further improve the preoperative differentiation and diagnostic yield of [^{18}F]FDG-PET/CT. **Materials and Methods:** We prospectively included [^{18}F]FDG-PET/CT scans of 132 patients with an indeterminate thyroid nodule. Receiver operating characteristic (ROC) curve analysis was performed for SUV_{max}, SUV_{peak}, SUV_{max}-ratio, and SUV_{peak}-ratio values, including assessment of threshold values at which malignancy was reliably ruled out (≥95% sensitivity). Subgroup analysis was performed for Hürthle cell nodules (n=31). Of the 91 [^{18}F]FDG-positive nodules, 80 (88%) EARL-compliant scans were subsequently included in a radiomics and machine learning assessment. After volumetric segmentation at 50% SUVpeak, 108 standardized radiomic features were extracted from [^{18}F]FDG-PET and low-dose CT images. Elastic Net Regression classifiers were trained and evaluated in a 20-times repeated random split. Dimensionality reduction using redundancy filtering and factor analysis was incorporated in the splits, retaining one factor for every 10 patients in the training sets. Predictive performance of radiomics was presented as mean AUC across test sets; 95% confidence intervals (CI) were constructed using a corrected resampled t-test. Results: Thirty-four of 132 (26%) patients had borderline or malignant tumors on histopathology; 32 were [^{18}F]FDG-positive. The SUV_{max}-ratio differentiated best between benign and borderline/malignant nodules (AUC 0.73 [95% CI, 0.64-0.82]); at a threshold of ≤1.2, 97.1% sensitivity and a 28% benign call rate were observed. Thirty of 31 (97%) oncocytic nodules were visually [^{18}F]FDG-positive; 9 (29%) were borderline/malignant. If higher thresholds were applied than in non-oncocytic nodules, all four [^{18}F]FDG-PET/CT-parameters accurately differentiated between benign and borderline/malignant oncocytic nodules. A SUV_{max}-ratio ≤3.4 showed 100% sensitivity and a 23% benign call rate (AUC 0.60 [95% CI, 0.39-0.81]). Radiomics analysis of [^{18}F]FDG-positive nodules showed a mean test set AUC of 0.50 [95% CI, 0.29-0.71] and 0.49 [95% CI, 0.32-0.66] for PET features and PET/CT features, respectively. **Conclusion:** Quantitative [^{18}F]FDG-PET/CT assessment may aid the pre-operative differentiation of indeterminate thyroid nodules. Different SUV-thresholds should be applied in oncocytic and non-oncocytic nodules to optimize diagnostic yield. Radiomic analysis with machine learning did not contribute to further differentiation of [^{18}F]FDG-positive nodules. **References:** None

OP-1081

Do ultrasound elastography and thyroid imaging reporting and data systems correctly classify hyperfunctioning nodules on thyroid scintigraphy?

M. Tuncel, B. S. Turan, Z. Işık;

Hacettepe University, Department of Nuclear Medicine, Ankara, TURKEY.

Aim/Introduction: Ultrasound elastography and thyroid imaging reporting and data systems(TI-RADS) are commonly used to classify thyroid nodules as benign or malignant and