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The Relation of Clinical, Pathological Properties and PET/CT Uptake with EGFR Mutation, Positive ALK and ROS-1 Expression in Non Small Cell Lung Cancer

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Objectives: The main molecular changes that can be targeted in NSCLC for today are EGFR mutation, ALK translocation and ROS1 translocation. Previous studies on the predictive role of 18F- FDG PET/CT for EGFR mutations in patients with NSCLC are conflicting. The aim of this study was to evaluate the relationship between FDG uptake changes, genetic mutation status and clinical parameters of patients diagnosed with NSCLC in our clinic retrospectively and to investigate whether 18F-FDG PET are valuable in predicting EGFR mutations, ALK and ROS-1 rearrangement.

Methods: We included 114 patients with NSCLC who received 18F-FDG PET/CT before treatment and were tested for EGFR mutations or ALK and ROS1 reerrangement in our outpatient clinic. Subgroups were divided into several clinical features and differences between the three parameters based on FDG PET/CT, including maximum lymph node (nSUVmax) and distant metastasis (mSUVmax) of the primary tumor (tSUVmax). Multivariate logistic regression analysis was performed to determine the predictors of EGFR mutations and ALK positivity.

Results: A total of 114 patients with a mean age of 58.51±10.38 years were included in the study. EGFR mutation in 22 patients; 12 patients had ALK and 3 patients had ROS-1 translocation. EGFR mutations were more common in women and non-smokers (respectively p=0.000 and 0.001). ROS mutation was also observed in women (p=0.012). Patients with ALK-positive NSCLC were younger and the rate of ALK was higher in smokers (respectively p=0.005, 0.025). The presence of pleural fluid was found to be related with ALK positivity (p=0,014). In EGFR-positive patients, tsuvmax was the only PET parameter that was lower than EGFR negative patients (0.032). In the adecarcinoma subgroup only nSUVmax was found to be significantly lower in EGFR positive patients than in EGFR negative patients (p=0.042). No statistically significant difference was found between ALK-positive patients and ALK-negative patients in terms of neither primary tumor nor nSUVmax and mSUVmax. The ROC curve analysis revealed that the cutoff point for the tSUVmax was ≤14,7; 95.4% sensitivity, 31.8% specificity, 25.3% positive predictive value, 96.7% negative predictive value were achievedand AUC was 0.648 (95% CI 0.553-0.736) (p=0.017). In multivariate analysis, only female gender showed that EGFR mutations were determinant and that EGFR mutation was 6.5 times higher than that of males (OR: 6.56, GA: 2.3-18.9; p=0.001).

Conclusion: Low tSUVmax is associated with EGFR mutation and can be integrated with other clinical factors to increase the discrimination in the EGFR mutation status in selected NSCLC patients with no EGFR mutation test.

Keywords: Epidermal growth factor receptor, anaplastic lymphoma kinase, mutation, non-small cell lung cancer, positron emission tomography, standard uptake value