

Purpose: Usual clinical practice consists in assessing therapy response after treatment. Recently, several studies have suggested predicting response based on maximum SUV (SUV_{max}) evolution between the initial 18F-FDG PET scan and a second one acquired early during treatment. SUV_{max} is however a very restrictive measurement of the entire functional tumor metabolism, and it would be even more valuable to be able to predict response before the start of the treatment. The objective of this study was to investigate the predictive value of more complete functional tumor measurements.

Methods: 50 patients with locally advanced esophageal cancer treated with exclusive concomitant radiochemotherapy between 2005 and 2008 were retrospectively analyzed. Patients were classified as complete, partial or non responders (including stable and progressive disease) according to RECIST criteria. Classification of complete and non responders was confirmed by biopsy. Measurements of primary tumors on the pre treatment image were carried out based on delineations performed using the automatic Fuzzy Locally Adaptive Bayesian algorithm. SUV_{max} and peak SUV (SUV_{peak}), the metabolically active tumor volume (TV) and its associated mean SUV (SUV_{mean}), and total lesion glycolysis (TLG=TV×SUV_{mean}) were considered. The predictive value of each parameter was investigated by assessing their correlation with the response to therapy, using Kruskal-Wallis tests.

Results: 14 patients were classified as non responders (NR), 25 as partial responders (PR) and 11 as complete responders (CR). None of the SUV measurements was a significant predictive factor of the response ($p>0.05$). On the contrary, parameters related to tumor functional spatial extent (TV, TLG) allowed significant differentiation of all three groups of patients ($p<0.0001$).

Conclusion: Spatial measurements of tumors (such as TV and TLG) carried out on 18F-FDG PET baseline scans are promising predictive factors of concomitant radiochemotherapy response, with statistically higher predictive value than any SUV measurements in advanced esophageal cancer.