Molecular imaging of proliferation and glucose utilization: utility for monitoring response and prognosis after neoadjuvant therapy in locally advanced gastric cancer.

Abstract:
Metabolic imaging of gastric cancer is limited due to the 30% of primary tumors that are not (18)F-fluorodeoxyglucose (FDG) avid. In contrast, the proliferation marker (18)F-fluorothymidine (FLT) has been shown to visualize also non-FDG-avid gastric tumors. In this study we tested whether FLT-positron emission tomography (PET) can improve the predictive potential of molecular imaging for assessing response to neoadjuvant therapy in gastric cancer compared with FDG-PET. 45 patients with gastric cancer underwent FDG- and FLT-PET before and 2 weeks after initiation of chemotherapy. FDG/FLT-PET findings and Ki67 immunohistochemistry were correlated with clinical and histopathological response and survival. 14 patients had non-FDG-avid tumors, whereas all tumors could be visualized by FLT-PET. No significant association of clinical or histopathological response with any of the analyzed metabolic parameters [initial standardized uptake value (SUV), SUV after 2 weeks, change of SUV for FDG/FLT] was found. Univariate Cox regression analysis for Ki67 and metabolic parameters revealed significant prognostic impact for survival only for FLT SUV(mean) day 14 (p=0.048) and Ki67 (p=0.006). Multivariate Cox
regression analysis (including clinical response, Lauren type, ypN category, and FLT SUV(mean) day 14) revealed Lauren type and FLT SUV(mean) day 14 as the only significant prognostic factors (p=0.006, p=0.002). FLT uptake 2 weeks after initiation of therapy was shown to be the only imaging parameter with significant prognostic impact. Neither FLT-PET nor FDG-PET were correlated with histopathological or clinical response. However, these data must be interpreted with caution due to the single-center trial study design, relatively short follow-up, poor response rates, and unfavorable prognosis.