Predictive value of FDG-PET in patients with advanced medullary thyroid cancer undergoing vandetanib treatment

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ABSTRACT

Introduction: The prognosis of medullary thyroid carcinoma (MTC) is poor using common chemotherapeutic approaches. However, during the last years encouraging results of recently introduced tyrosine kinase inhibitors (TKI) such as vandetanib have been published. In this study we aimed to correlate the results of ^{18}F-fluorodeoxyglucose ([^{18}F]FDG) positron emission tomography (PET) imaging with treatment outcome.

Methods: Eighteen patients after thyroidectomy with recurrent/advanced MTC lesions receiving vandetanib (300 mg orally/day) could be analysed. A baseline ^{18}F-FDG PET prior to and a follow-up ^{18}F-FDG PET 3 months after TKI initiation were performed. During follow-up, tumor progression was assessed every 3 months including computed tomography according to RECIST. Progression-free survival (PFS) was correlated with the maximum standardized uptake value of ^{18}F-FDG in lymph nodes ($SUV(LN)_{max}$) or visceral metastases ($SUV(MTS)_{max}$) as well as with clinical parameters using ROC analysis.

Results: Within median 3.6 years of follow-up, 9 patients showed disease progression at median 8.5 months after TKI initiation. An elevated glucose consumption assessed by baseline ^{18}F-FDG PET ($SUV(LN)_{max}$ > 7.25) could predict a shorter PFS (2 y) with an accuracy of 76.5% ($SUV(LN)_{max}$ <7.25, 4.3 y; p=0.03). Accordingly, preserved tumor metabolism in the follow-up PET ($SUV(MTS)_{max}$ >2.7) also demonstrated an unfavorable prognosis (accuracy, 85.7%). On the other hand, none of the clinical parameters reached significance in response prediction.

Conclusions: In patients with advanced and progressive MTC, tumors with higher metabolic activity at baseline are more aggressive and more prone to progression as reflected by a shorter PFS; they should be monitored more closely. Preserved glucose consumption 3 months after treatment initiation was also related to poorer prognosis.

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