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Marked, Homogeneous, and Early [^{18}F]Fluorodeoxyglucose–Positron Emission Tomography Responses to Vemurafenib in *BRAF*-Mutant Advanced Melanoma

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Abstract

Purpose Imaging with [^{18}F]fluorodeoxyglucose (FDG) –positron emission tomography (PET) allows early recognition of a response to agents that target key driver mutations in human cancer. We aimed to determine the metabolic response rate to vemurafenib in patients with advanced *BRAF*-mutant melanoma.

Patients and Methods Baseline and day 15 FDG-PET was evaluated in 31 patients with advanced melanoma treated in a phase I study of dose escalation of vemurafenib (PLX06-02), which included four patients treated at subtherapeutic doses and 24 patients treated at 960 mg twice a day, which is the maximum-tolerated dose of vemurafenib.

Results All 27 patients treated at potentially therapeutic levels had at least a partial metabolic response, and three patients achieved a complete metabolic response. In the 27 patients, there was an 80% ± 3% reduction in the maximum standardized uptake value (SUVmax) of target lesions and an 87% ± 3% decrease in the percentage of injected dose (%ID) in all identified disease sites. There was a positive correlation between %ID in all identified disease and target-lesion SUVmax (r^2 = 0.66; P < .001) that indicated a significant homogeneity of the response between lesions in individual patients. Although no relationship was found between the reduction in target lesion SUVmax and best response according to RECIST (Response Evaluation Criteria in Solid Tumors), there was a trend for patients with greater reductions in uptake of FDG to have longer progression-free survival.

Conclusion FDG-PET is a useful marker of an early biologic response to vemurafenib. Little variability in PET response was found between lesions in individual patients, which suggested minimal intrapatient molecular heterogeneity. FDG-PET is a useful tool for the evaluation of the biologic impact of inhibiting mutant BRAF and may allow for the more effective development of novel agents.