Glioblastoma Multiforme Recurrence: An Exploratory Study of (18)F FPPRGD2 PET/CT.


Abstract

PURPOSE: To prospectively evaluate fluorine 18 ((18)F) 2-fluoropropionyl-labeled PEGylated dimeric arginine-glycine-aspartic acid (RGD) peptide (PEG3-E[RGDykk])2 (FPPRGD2) positron emission tomography (PET) in patients with glioblastoma multiforme (GBM).

MATERIALS AND METHODS: The institutional review board approved this HIPAA-compliant protocol. Written informed consent was obtained from each patient. (18)F FPPRGD2 uptake was measured semiquantitatively in the form of maximum standardized uptake values (SUV(max)) and uptake volumes before and after treatment with bevacizumab. Vital signs and laboratory results were collected before, during, and after the examinations. A nonparametric version of multivariate analysis of variance was used to assess safety outcome measures simultaneously across time points. A paired two-sample t test was performed to compare SUV(max).

RESULTS: A total of 17 participants (eight men, nine women; age range, 25-65 years) were enrolled prospectively. (18)F FPPRGD2 PET/computed tomography (CT), (18)F fluorodeoxyglucose (FDG) PET/CT, and brain magnetic resonance (MR) imaging were performed within 3 weeks, prior to the start of bevacizumab therapy. In eight of the 17 patients (47%), (18)F FPPRGD2 PET/CT was repeated 1 week after the start of bevacizumab therapy; six patients (35%) underwent (18)F FPPRGD2 PET/CT a third time 6 weeks after starting bevacizumab therapy. There were no changes in vital signs, electrocardiographic findings, or laboratory values that qualified as adverse events. One patient (6%) had recurrent GBM identified only on (18)F FPPRGD2 PET images, and subsequent MR images enabled confirmation of recurrence. Of the 17 patients, 14 (82%) had recurrent GBM identified on (18)F FPPRGD2 PET and brain MR images, while (18)F FDG PET enabled identification of recurrence in 13 (76%) patients. Two patients (12%) had no recurrent GBM.

CONCLUSION: (18)F FPPRGD2 is a safe PET radiopharmaceutical that has increased uptake in GBM lesions. Larger cohorts are required to confirm these preliminary findings.

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