

Assessment of proliferating activity in high-uptake areas on positron emission tomography with the hypoxic radiotracer [¹⁸F]FRP-170 in glioblastoma

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Abstract

Purpose: The aim of this study was to clarify how the high-uptake areas on positron emission tomography (PET) with the hypoxic cell radiotracer, 1-(2-[¹⁸F]fluoro-1-[hydroxymethyl]ethoxy) methyl-2-nitroimidazole (FRP-170) remain proliferating activity.

Procedures: Ten patients with glioblastoma underwent FRP-170 PET before tumor resection. During surgery, tumor specimens were stereotaxically obtained from regions corresponding to high (high-uptake areas, HUA) and relatively low (low-uptake areas, LUA) accumulation of FRP-170. We compared immunohistochemical staining for Ki-67 and hypoxia inducible factor (HIF)-1 α between HUA and LUA. In 2 patients, overlap of HUAs between ¹⁸F-FRP-170 PET and L-methyl-¹¹C-methionine (MET) PET was assessed using fusion imaging.

Results: HIF-1 α index was significantly higher in HUA than LUA. Mean of Ki-67 index in HUA showed no significant difference from LUA. HUAs of FRP-170 and MET overlapped partially within a tumor on fusion imaging.

Conclusion: The present findings suggest that HUA of FRP-170 PET include lesions remaining proliferating activity regardless of hypoxic tissues.