Diagnosis of glioma recurrence using multiparametric dynamic 18F-fluoroethyl-tyrosine PET-MRI.

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OBJECTIVES: To investigate the value of combined 18F-fluorethyltyrosine-(FET)-PET/MRI for differentiation between recurrence and treatment-related changes in glioma patients.

METHODS: 63 lesions suggestive of recurrence in 47 glioma patients were retrospectively identified. All patients had a dynamic FET scan, as well as morphologic MRI, PWI and DWI on a hybrid PET/MRI scanner. Lesions suggestive of recurrence were marked. ROC analysis was performed univariately and on parameter combination.

RESULTS: 50 lesions were classified as recurrence, 13 as radiation necrosis. Diagnosis was based on histology in 23 and follow-up imaging in 40 cases. Sensitivities and specificities for static PET were 80 and 85%, 66% and 77% for PWI, 62 and 77% for DWI and 64 and 79% for PET time-to-peak. AUC was 0.86 (p < 0.001) for static PET, 0.73 (p = 0.013) for PWI, 0.70 (p = 0.030) for DWI and 0.73 (p < 0.001) for dynamic PET. Multiparametric analysis resulted in an AUC of 0.89, notably yielding sensitivity of 76% vs. 56% for PET alone at 100% specificity.

CONCLUSION: Simultaneous dynamic FET-PET/MRI was reliably feasible for imaging of recurrent glioma. While all modalities were able to discriminate between recurrence and treatment-related changes, multiparametric analysis added value especially when high specificity was demanded.

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