Detecting CXCR4 Expression in Meningioma on ^{68}Ga-Pentixafor PET/MRI

Simone Krebs[1–3], Jazmin Schwartz[4], Christian Grommes[5], Robert J. Young[6], Heiko Schöder[1,2], and Marius E. Mayerhoefer[1,2,7]

[1]*Molecular Imaging and Therapy Service, Department of Radiology, Memorial Sloan Kettering Cancer Center, New York, New York;* [2]*Department of Radiology, Weill Cornell Medical College, New York, New York;* [3]*Radiochemistry and Imaging Sciences Service, Department of Radiology, Memorial Sloan Kettering Cancer Center, New York, New York;* [4]*Department of Medical Physics, Memorial Sloan Kettering Cancer Center, New York, New York;* [5]*Department of Neurology, Memorial Sloan Kettering Cancer Center, New York, New York;* [6]*Neuroradiology Service, Department of Radiology, Memorial Sloan Kettering Cancer Center, New York, New York; and* [7]*Body Imaging Service, Department of Radiology, Memorial Sloan Kettering Cancer Center, New York, New York*

The C-X-C chemokine receptor 4 (CXCR4) is crucial for tumor proliferation, migration, and angiogenesis in many different cancers. Recently, ^{68}Ga-pentixafor, a radiotracer comprising a synthetic, cyclic pentapeptide analog of stromal cell–derived factor 1, a ligand for CXCR4, has been successfully introduced for assessment of hematologic malignancies, including lymphomas of the body and central nervous system, myeloma, and leukemia (*1,2*). Furthermore, ^{68}Ga-pentixafor uptake has been described in various solid tumors but not yet in meningioma.

We report the case of a 67-y-old woman with newly diagnosed primary central nervous system lymphoma who was referred for ^{68}Ga-pentixafor PET/MRI (NCT05093335) 2 d after MRI was performed with intravenously injected gadopentetate dimeglumine (Magnevist; Bayer Healthcare Pharmaceuticals). PET imaging was acquired for 15 min starting 15 min after intravenous injection of 150 MBq of ^{68}Ga-pentixafor on a hybrid device (Signa PET/MR; GE Healthcare). PET demonstrated a homogeneously enhancing lesion in the right temporal lobe with an SUV_{max} of 5.3 (Fig. 1). Incidentally, slightly lower uptake, with an SUV_{max} of 4.8, was observed in a dura-based extraaxial homogeneously enhancing mass in the left middle cranial fossa, a known meningioma.

Here, we show that ^{68}Ga-pentixafor can detect not only central nervous system lymphoma but also meningioma with a high tumor-to-background activity ratio on PET, given the minimal uptake of this radiotracer in brain parenchyma. A recent analysis in 55 meningioma specimens showed that CXCR4 messenger RNA was expressed in 43 (78%) of the tumor specimens, and CXCR4 stimulation led to extracellular signal-regulated protein kinase 1 and 2 phosphorylation/activation and cell proliferation (*3*). CXCR4 and stromal cell–derived factor 1 were often detected in the same tumor tissues, suggesting an autocrine–paracrine feedback loop potentially promoting the phenotypic behavior of the tumor, such as the ability to grow autonomously.

Our findings suggest that ^{68}Ga-pentixafor PET may be useful for delineation of meningioma and for elucidating biologic characteristics

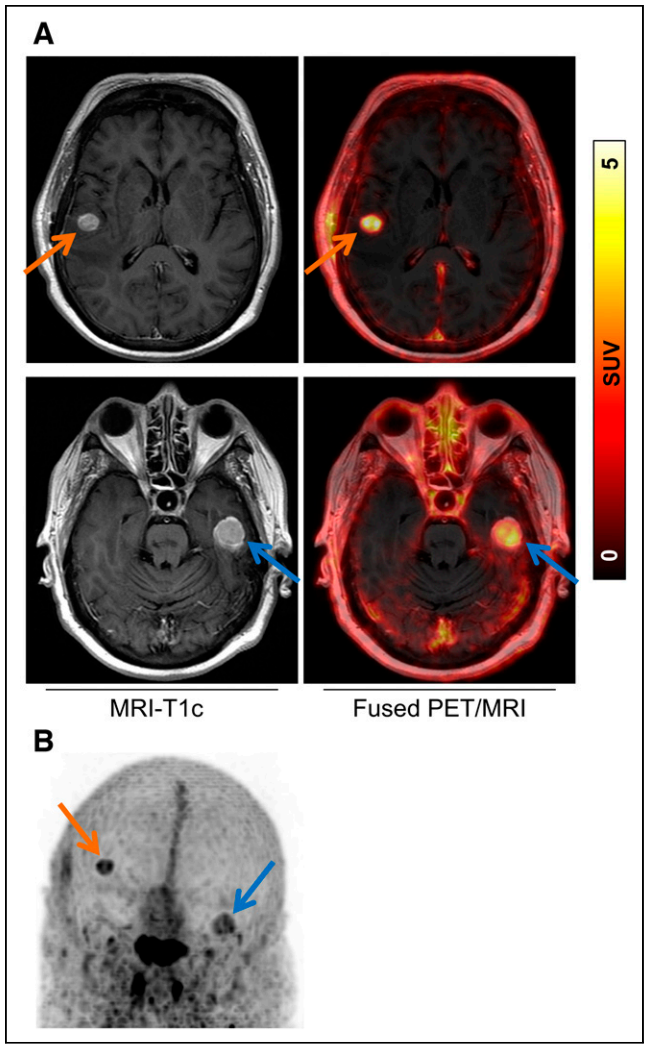

FIGURE 1. Contrast-enhanced T1-weighted MR images showing enhancing lesions with focal ^{68}Ga-pentixafor uptake on axial PET/MRI (A) and on maximum-intensity-projection PET (B), corresponding to biopsy-proven lymphoma (orange arrows) and known meningioma (blue arrows).

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For correspondence or reprints, contact Simone Krebs (krebss@mskcc.org).
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and that, especially in treatment-refractory meningiomas, ^{68}Ga-pentixafor PET may guide CXCR4-based theranostic approaches with pentixather that were previously evaluated in blood cancers (*4*).

DISCLOSURE

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