First-in-Humans PET/MRI of In Vivo GD2 Expression in Osteosarcoma

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Osteosarcoma is a malignant bone tumor with very limited therapeutic options (*1*). However, targeting the frequently overexpressed disialoganglioside GD2 was successful in preclinical studies with bispecific GD2 antibodies (*2*), and a clinical trial is ongoing using the clinically approved GD2 antibody dinutuximab in osteosarcoma patients (NCT02484443). Recently, we developed the radiolabeled antibody [^{64}Cu]Cu-DOTAGA-ch14.18/CHO to evaluate GD2 expression by PET (*3*).

Here, we assessed the in vivo GD2 expression in a heavily pretreated woman with progressive pulmonary osteosarcoma metastasis for potential therapy stratification (compassionate use according to German Medicinal Products Act AMG §13.2b). PET/MRI was performed 19 h after injection of 234 MBq of [^{64}Cu]Cu-NOTA-ch14.18/CHO and revealed increased tracer retention with a high signal-to-background ratio bilaterally in the pulmonary metastases (SUV_{max}, 9.8; Fig. 1). The background uptake in normal lung tissue and blood pool was reasonably low, whereas retention in the liver was relatively high. An intense GD2 expression was confirmed in a resected pulmonary metastasis by GD2 immunohistochemistry and by cyclic immunofluorescence staining.

To the best of our knowledge, we present here the first report of clinical GD2 PET/MRI in an osteosarcoma patient with pulmonary metastasis. Our findings demonstrate that GD2 expression can be assessed noninvasively in vivo using [^{64}Cu]Cu-NOTA-ch14.18/CHO-PET/MRI, which might open new possibilities for therapy stratification

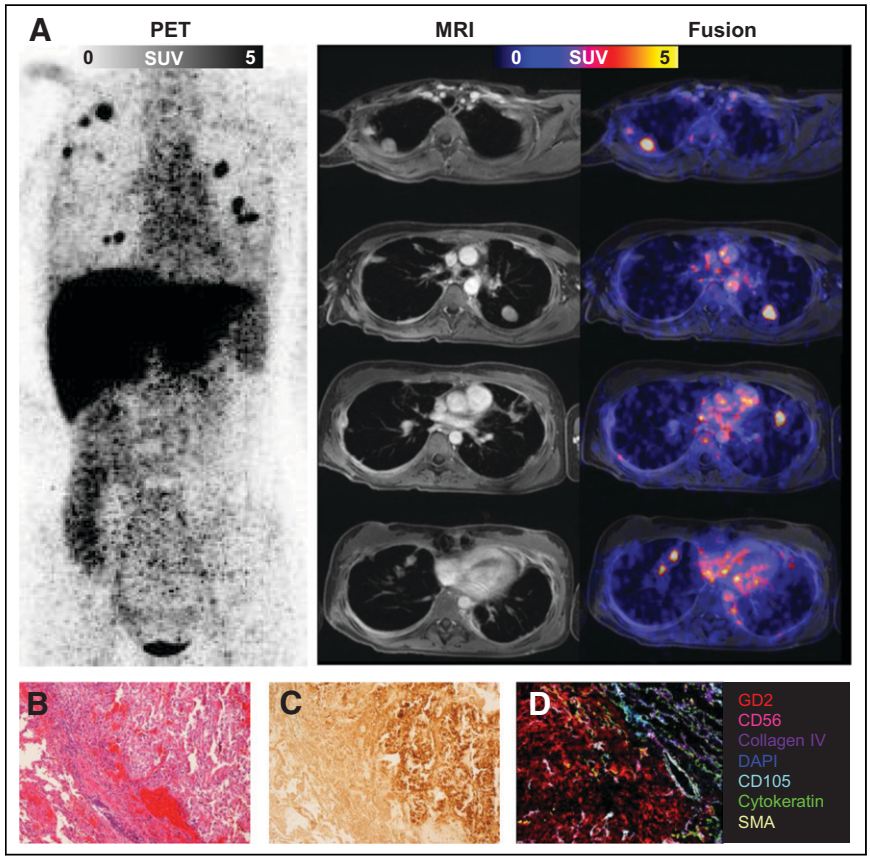

FIGURE 1. (A) Maximum-intensity projection (left) and representative transaxial slices (right) of [^{64}Cu]Cu-NOTA-ch14.18/CHO-PET/MRI. (B) Hematoxylin and eosin staining. (C) GD2 immunochemistry. (D) Cyclic immunofluorescence staining of resected pulmonary osteosarcoma metastasis.

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in GD2-expressing tumor entities such as osteosarcoma or melanoma.

DISCLOSURE

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