Antibody-Guided Molecular Imaging of *Aspergillus* Lung Infections in Leukemia Patients

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Invasive pulmonary aspergillosis (IPA) caused by the fungus *Aspergillus fumigatus* (Fig. 1A) is a life-threatening lung disease of acute myeloid leukemia patients, with the diagnosis currently being reliant on invasive, slow, or nonspecific procedures, including chest CT (*1*). Here, we showcase the (to our knowledge) first-time use in humans of an *Aspergillus*-specific radiotracer (*2,3*) administered to acute myeloid leukemia patients diagnosed with no IPA or with IPA according to consensus definitions of the disease. The subjects underwent ^{64}Cu-NODAGA-hJF5-PET/MRI on a compassionate-use basis according to the German Medicinal Products Act (Arzneimittelgesetz §13.2b). Scientific analysis was approved by the institutional review board (approval 206/2020BO2). Written informed consent was obtained from all patients.

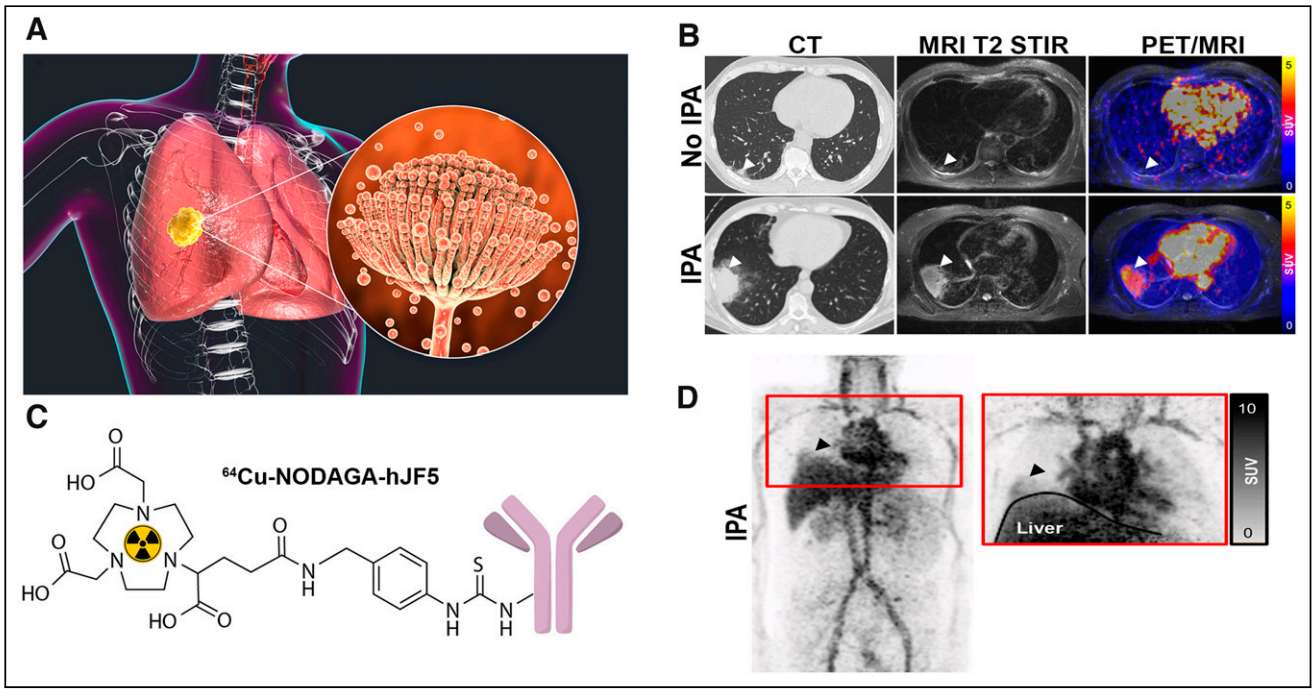

FIGURE 1. (A) Inhaled spores of opportunistic fungal pathogen *Aspergillus fumigatus* (inset) can lead to IPA in AML patients. (B) Immuno-PET/MRI of patient 1 (no IPA) shows no tracer uptake in lung lesion (arrowheads); patient 2, diagnosed with IPA, shows enhanced tracer uptake in pulmonary lesion of right lower lobe (arrowheads). CT scans were acquired 1 wk before PET/MRI. (C) Chemical structure is shown for *Aspergillus*-specific radiotracer ^{64}Cu-NODAGA-hJF5. (D) Maximum-intensity projection of ^{64}Cu-NODAGA-hJF5 in patient 2 shows pulmonary lesion (arrowheads).

Uptake of the tracer in pulmonary lesions was determined using PET/MRI 15–18 h after intravenous injection with 196–287 MBq (Figs. 1B and 1C). In patient 1, no tracer uptake (SUV_{max}, 2.5; SUV_{mean}, 1.1;

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size [CT], 1.3 × 1.2 × 1.6 cm) above background levels (SUV_{mean} liver, 5.9; SUV_{mean} blood pool, 6.5; SUV_{mean} lung, 0.9) was observed in the lung lesion, concordant with no IPA. Patient 2, diagnosed with IPA, showed pronounced uptake of the tracer in the pulmonary lesion of the right lower lobe (SUV_{max}, 5.94; size [CT], 6.2 × 4.0 × 4.1 cm; SUV_{mean} liver, 6.1; SUV_{mean} blood pool, 7.0; SUV_{mean} lung, 0.8; maximum-intensity projection, Fig. 1D). This first-in-humans study shows the potential of antibody-guided PET for noninvasive IPA detection.

DISCLOSURE

Christopher Thornton is the director of ISCA Diagnostics Limited. No other potential conflict of interest relevant to this article was reported.

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