



## FAPI-PET/CT improves staging in a lung cancer patient with cerebral metastasis

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### Image of the month

FDG-PET/CT is the current mainstay of lung cancer staging and presents favorable sensitivity and specificity in comparison to morphological diagnostic means especially for mediastinal lymph-node assessment. However, high physiological uptake in the brain requires additional cerebral magnetic resonance imaging to complete M-staging. Although not a major limitation, the dependency of FDG on blood sugar and the need of preparatory fasting and to recline during the 1-h uptake phase is inconvenient, hampering smooth patient workflow [1].

Recently, quinoline-based ligands targeting cancer-associated fibroblasts (fibroblast activating protein inhibitors;

FAPI) have been developed [2, 3] and were found promising alternatives to FDG in several oncologic indications [4, 5].

Our image presents a FAPI-PET/CT (100 MBq <sup>68</sup>Ga-FAPI-04) acquired 15 min post i.v. injection of a patient with an adenocarcinoma of the lung. Maximum intensity projection of whole-body (WB-MIP, picture-in-picture) and its zoom to the relevant upper body half (*big picture*) already demonstrate the high tumor-to-background ratios of this promising new tracer in lung, mediastinum and brain. Two brain lesions not delineable on the unenhanced CT performed as part of the PET/CT, one of them with only 8–9 mm in diameter (*a*), presented FAPI-positive and were confirmed by contrast enhanced cerebral MRI (*a*, *b*); however, due to their typical imaging pattern of metastasis no biopsies have been taken. The histologically validated primary tumor in the right upper lobe but not surrounding pulmonary infiltrates demonstrates a positive FAP-expression (*c*). A FAPI-positive lymph node in regio-4R also demonstrated radiological criteria suspicious for malignancy in contrast-enhanced CT (*d*). Limited tumor mass with only a small T2a primary tumor and only one potential N2 lymph node metastasis without evidence of bone or visceral metastasis, would not imply high probability of brain lesions and eventually an additional brain MRI might have been omitted in such a patient to accelerate curative intended surgery.

Due to the potential to simplify clinical work-flow and its outstanding low physiological background in normal tissues (including liver and brain), FAPI-PET/CT seems to be a promising imaging probe for oncological patients. However, its true value in particular clinical indications still needs more detailed evaluation.

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This article is part of the Topical Collection on Image of the Month.

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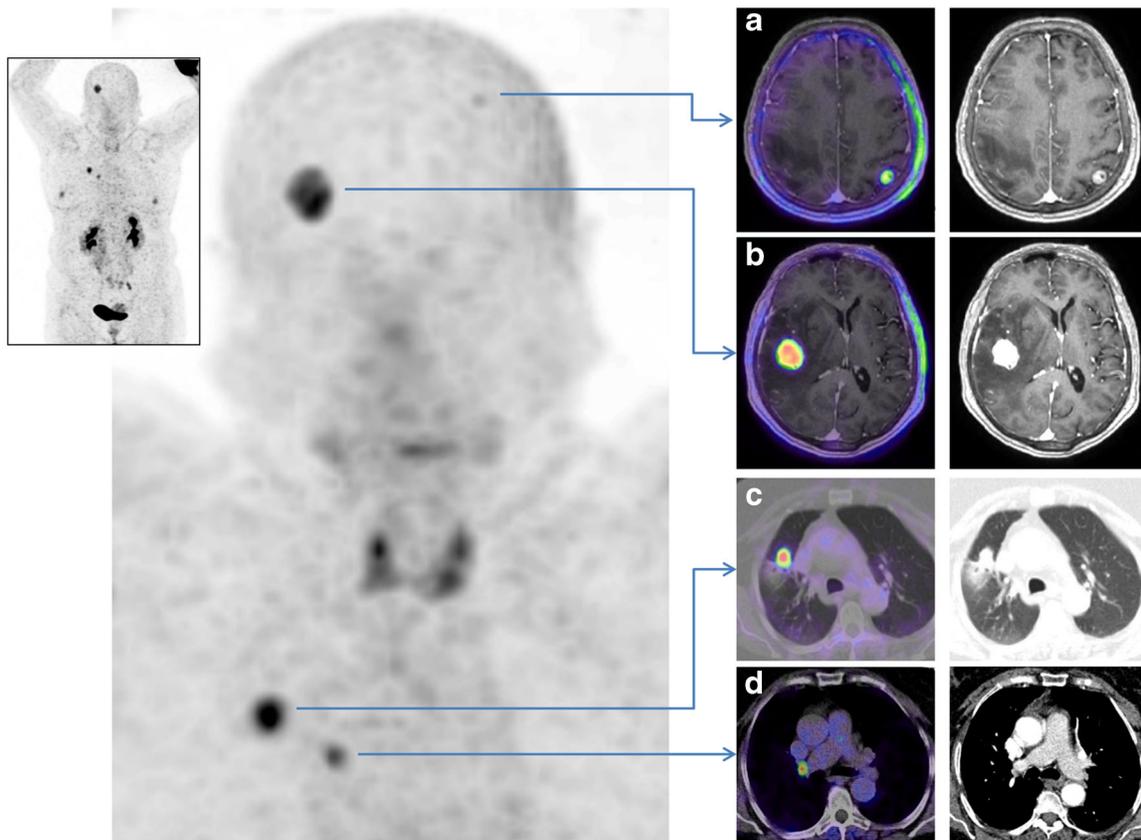
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## Compliance with ethical standards

**Informed consent and ethical approval** The radiopharmaceutical was used on an individual patient basis according to German Pharmaceuticals Act §13(2b). The patient gave written informed consent to receive the novel diagnostics and permitted anonymized publication of related medical data. The ethical committee of Heidelberg University approved this retrospective evaluation to be in accordance with the Helsinki declaration (permit S016/2018). For case reports from clinical practice no trial registration is required.

**Disclosure of potential conflicts of interest** Giesel FL, Lindner T, Haberkorn U, Kratochwil C have a patent application for quinolone-based radiolabeled FAPI-ligands. The other authors have no conflict of interest to declare.

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