IMAGING CORNER

^{68}Ga-FAPI PET in detection of ^{18}F-FDG PET Negative Cholangiocarcinoma: A Case Report on Alternative Molecular Imaging in Biliary Tract Malignancy

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Abstract
Fibroblast activation protein inhibitors (FAPI) PET is a new imaging approach that targets the cell population in the tumour surrounding stroma, particularly cancer-associated fibroblasts, rather than tumour cells. ^{68}Ga-FAPI PET/CT FAPI PET/CT provides better lesion characterisation due to a higher tumour-to-background ratio and exhibits high diagnostic accuracy, especially for cancers that exhibit low-to-moderate uptake of ^{18}F-FDG. We report the case of a 77-year-old woman with known renal cell carcinoma treated ten years ago, and recently presented with cholangitis and a liver lesion. ^{18}FDG PET-CT showed a mild hypermetabolic lesion at segment V. ^{68}Ga-FAPI PET/CT was performed for further assessment. ^{68}Ga-FAPI PET/CT demonstrates an intensely tracer avid lesion at hepatic segment V. These findings are likely due to primary cholangiocarcinoma. Biopsy confirms intrahepatic cholangiocarcinoma. ^{68}Ga-FAPI PET/CT FAPI PET/CT provides better lesion characterization due to a higher tumor-to-background ratio and exhibits high diagnostic accuracy in cholangiocarcinomas.

Keywords: ^{68}Ga-FAPI PET/CT; Cholangiocarcinoma; Fibroblast activation protein; cancer-associated fibroblasts Biliary Tract Malignancy.

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Discussion
A 77-year-old woman with a history of renal cell carcinoma status post right nephrectomy 10 years ago, presented with cholangitis and a liver lesion. ^{18}F-FDG PET/CT shows mild heterogenous uptake in hypodense hepatic segment V lesion. A differential of renal cell metastasis versus second primary was suspected. ^{68}Ga-FAPI PET/CT was performed for further evaluation, due to low ^{18}F-FDG uptake. It demonstrates an intensely avid hepatic segment V lesion with a linear area of

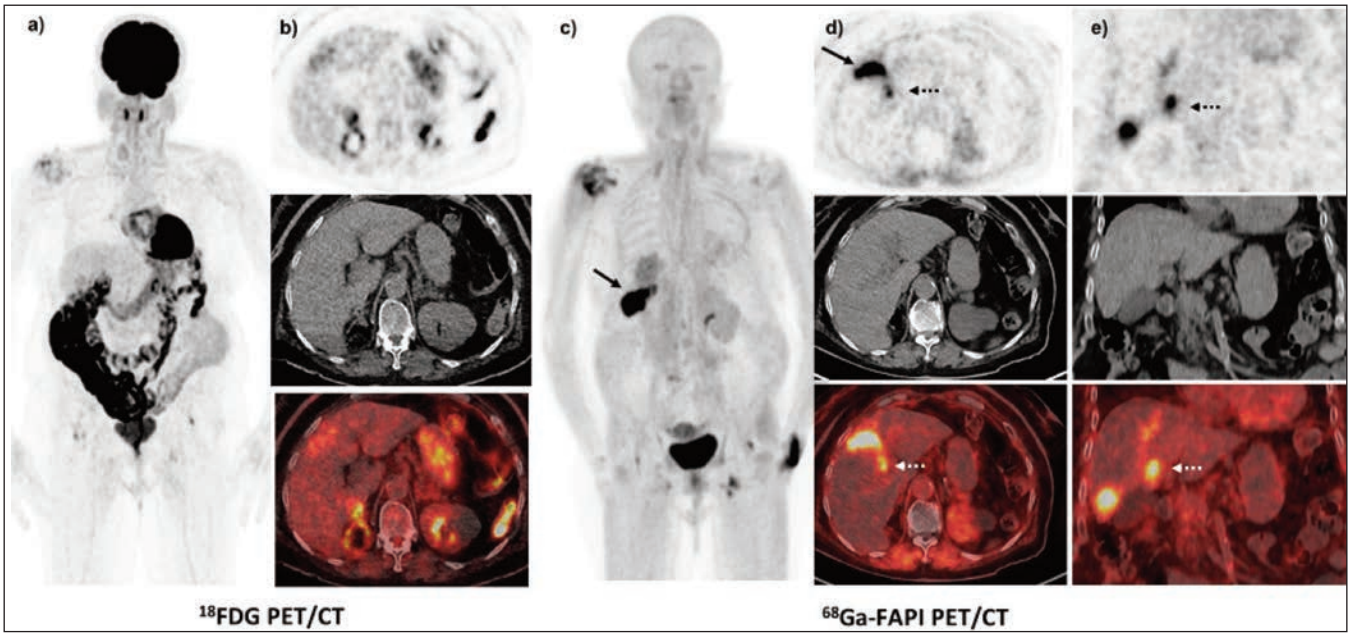

Figure: a, b) ^{18}FDG PET/CT shows mild heterogeneous uptake at segment V. c-e) ^{68}Ga-FAPI PET/CT demonstrates intensely tracer avid lesion in the liver, at segment 5(solid arrow) with another linear area of increased tracer uptake seen along the left hepatic duct reaching up to the hepatic hilum (dotted arrow) with a small nodular soft tissue seen. These findings appear likely due to primary cholangiocarcinoma. Biopsy shows intrahepatic cholangiocarcinoma.

increased tracer uptake seen along the left hepatic duct reaching up to the hepatic hilum with a small nodular soft tissue (Figure). These findings raised suspicion of primary cholangiocarcinoma. Biopsy showed intrahepatic cholangiocarcinoma.

Fibroblast activation protein inhibitor (FAPI) is used for PET imaging targetting the tumour's surrounding stroma cell population.[1] FAP, a type II transmembrane glycoprotein is expressed on activated fibroblasts such as cancer-associated fibroblasts (CAFs), forming a major component of tumour stroma, and can be used as a target for imaging solid tumours.[2] FAP is overexpressed in various types of cancers, particularly epithelial carcinoma.[3] In cancers exhibiting low-to-moderate ^{18}F-FDG uptake, including gastric, pancreatic, hepatic, biliary tract malignancy, and ovarian cancers ^{68}Ga-FAPI PET/CT may be superior.

Cholangiocarcinomas, the second most common liver malignancy, originates from the intra- and extrahepatic biliary tract.[3] ^{18}F-FDG PET is limited by intertumoural heterogeneous uptake. However, recent studies show the high accuracy of FAPI PET in cholangiocarcinoma due to abundant tumour stroma, predominately composed of cancer-associated fibroblasts. In our case, we demonstrate superior 68Ga-FAPI radiotracer uptake, better lesion characterisation, and detection in cholangiocarcinoma. ^{68}Ga-FAPI PET/CT is particularly valuable for initial staging, detecting metastases, and guiding personalised treatment strategies.

References

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