

$[^{18}\text{F}]\text{FECh}$ is a promising radiotracer for PET/CT imaging of prostate cancer

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Introduction: Many tumors are characterized by an enhanced cell proliferation. This is usually associated with an increased uptake and phosphorylation of choline to form phosphoryl choline which is used in the synthesis of membrane phospholipids.

$[^{11}\text{C}]\text{choline}$ has shown potential for the evaluation of brain tumors, esophageal carcinoma and prostate cancer.¹⁻³ Because of the short half-life of ^{11}C ($T_{1/2} = 20.3$ min), resulting in a limited usefulness for clinical routine, different ^{18}F -labeled ($T_{1/2} = 109.7$ min) analogues were synthesized to overcome this problem.

Recently, we reported that the addition of alkali iodides to 2- $[^{18}\text{F}]\text{fluoroethyltosylate}$ ($[^{18}\text{F}]\text{FETos}$) and 1-bromo-2- $[^{18}\text{F}]\text{fluoroethane}$ led to drastically increased radiochemical yields, most probably due to the *in situ* formation of 1-iodo-2- $[^{18}\text{F}]\text{fluoroethane}$.⁴

$[^{18}\text{F}]\text{FECh}$ was applied clinically for the detection of prostate cancer recurrences (in patients presenting with rising PSA levels) or for staging newly diagnosed patients before planned radiotherapy using PET/CT.

Results: Using PET/CT, $[^{18}\text{F}]\text{FECh}$ was shown to clearly localize in primary prostate cancer, lymph node and bone metastases. Occult metastases, not detected by conventional imaging methods (CT scan, MRI, bone scan) as well as local recurrences could be clearly visualized by $[^{18}\text{F}]\text{FECh}$ PET/CT (as confirmed by histology or fine needle biopsy).

Primary prostate cancer:

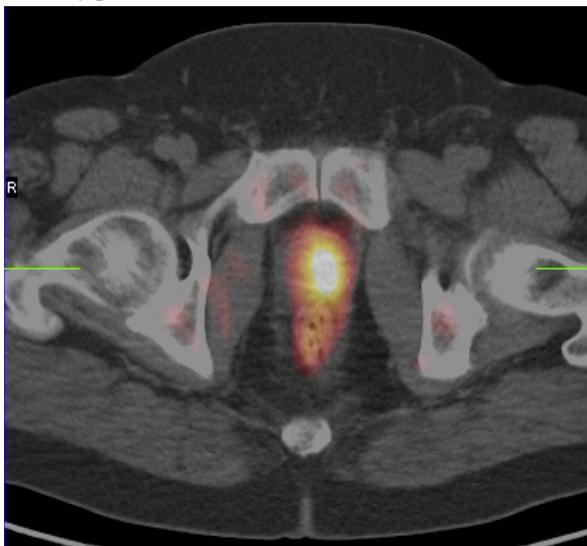


Fig. 1: $[^{18}\text{F}]\text{FECh}$ PET/CT for imaging primary prostate cancer: strong uptake in the left lobe.

Lymph node metastases: $[^{18}\text{F}]\text{FECh}$ -PET/CT allows for the detection of lymph node metastases as small as 5 – 10 mm in diameter.

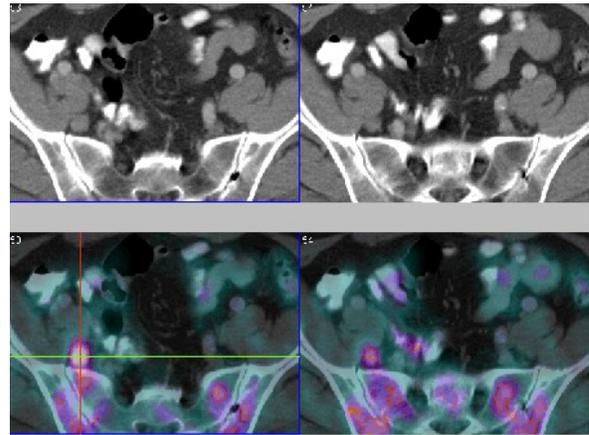


Fig. 2: $[^{18}\text{F}]\text{FECh}$ PET/CT: detection of a previously unknown lymph node metastasis in the pelvis.

Bone metastases: Also osseous metastases can be easily visualized by $[^{18}\text{F}]\text{FECh}$ -PET/CT.

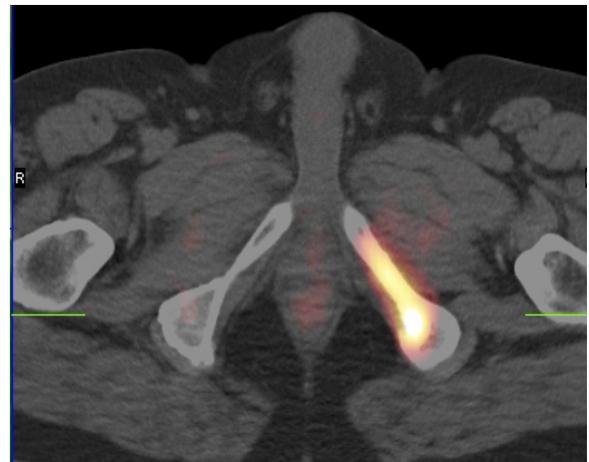


Fig. 3: $[^{18}\text{F}]\text{FECh}$ PET/CT: detection of a previously unknown bone metastasis in the pelvis. The patient was originally planned for radical prostatectomy.

Conclusion: $[^{18}\text{F}]\text{FECh}$ appears to be a very valuable new tracer for the primary staging and for restaging of prostate carcinoma, in particular when using PET/CT. Due to a more versatile handling it has advantages compared to $[^{11}\text{C}]\text{Choline}$ diagnostic studies using $[^{18}\text{F}]\text{FECh}$ could significantly improve the management of prostate cancer (better staging, esp. detection of lymph node metastases and higher sensitivity for the early detection of recurrences).

References:

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