ASSESSMENT OF THE METASTATIC EXTENT OF A SOLITARY FIBROUS TUMOUR USING 68GA-FAPI PET AND OF ELIGIBILITY FOR 90Y-FAPI THERAPY : A CASE STUDY

Panaitescu A[1], Desormiers L[1], Desaulniers M[1].

[1] Nuclear Medicine Service, Faculty of Medicine and Health Sciences (FMHS), Université de Sherbrooke, Sherbrooke (QC), Canada

INTRODUCTION

Solitary fibrous tumors (SFT) are rare mesenchymal tumors (<2% of soft tissue tumors), diagnosed primarily between ages 20 and 70 (peak at 50 years). Local or metastatic recurrence occurs in 10–40% of cases. Although classically located at the pulmonary pleura, extrathoracic locations are also described in the literature, including the head, neck, breast, spinal cord, and prostate.

SFTs show strong expression of fibroblast activation protein (FAPα) messenger RNA, making them an ideal target for the **FAPI** (***F**ibroblast **A**ctivation **P**rotein **I**nhibitor*) tracer for both diagnostic and therapeutic purposes.

CASE PRESENTATION

31-year-old male with a metastatic and multi-recurrent solitary fibrous tumor (WHO grade 3) diagnosed at age 17.

February 2013 — Subtotal resection of an infratentorial intracranial dural-based mass; second-look surgery in April 2013.
Pathology : **atypical meningioma WHO grade 2.**
Local radiotherapy in May 2013.

April 2019 — Symptomatic left foraminal metastatic recurrence (C2–C3). Surgical debulking with fusion + local radiotherapy.
Revised pathology : **solitary fibrous tumor WHO grade 3.**

July 2020 — Multiple pulmonary nodules and left axillary adenopathies. Axillary dissection **(1 N+ out of 15)** with radiotherapy.

April 2022 — Neurological progression; new lesions at **left C5-C6** and **right C6-C7**. Lytic lesion at **C1** appeared in June 2023.

August 2023 – June 2025 — **Pazopanib**, stopped due to radiological progression.

November 2025 – March 2026 — 4 cycles of Pluvicto (**177Lu-PSMA**) due to high PSMA uptake of cervical lesions; radiological progression at right C6-C7.

April 2026 — **Temozolomide + bevacizumab** initiated due to progression.

OBJECTIVES AND METHODS

To perform the first clinical 68Ga-FAPI PET scan in Canada in a patient with metastatic solitary fibrous tumor.

- ❖Characterize the full extent of the metastatic burden and compare lesion detection with FAPI versus FDG, PSMA, and MRI.
- ❖Rule out dedifferentiated disease (FDG-positive / FAPI-negative lesions).
- ❖Assess the patient's eligibility for 90Y-FAPI therapy.

Intravenous administration of **124 MBq of 68Ga-FAPI (images at 30 and 60 minutes post-injection).**

RESULTS

Cervical level

- ❖FAPI uptake in all lesions known on FDG, PSMA, and MRI :
  - ➢C1, left paramedian — 61x50x43 mm, SUVmax of 63;
  - ➢C4-C6, left paramedian — 33x45x49 mm, SUVmax of 93,5;
  - ➢C6-C7, right paramedian — 42x44x47 mm, SUVmax of 53,4.
- ❖Left cervical lymphadenopathy (lateral to C3) — 15x14x14 mm, SUVmax of 56,4; poorly avid on PSMA and not hypermetabolic on FDG → **lesion better characterised by FAPI.**

Thoracic level

- ❖9 mm nodule at the right anterior base, highly avid on FAPI (SUVmax of 10.3) → **lesion non-avid on FDG.**
- ❖No FAPI uptake found in the other micronodules.

Osseous level

- ❖Metastasis at the vertebral body-pedicle junction of T3, SUVmax of 12 → **lesion occult on the other modalities (FDG, PSMA, MRI)**

False positive

- ❖Fracture of the anterior arc of the left 6th rib, highly avid on FAPI.

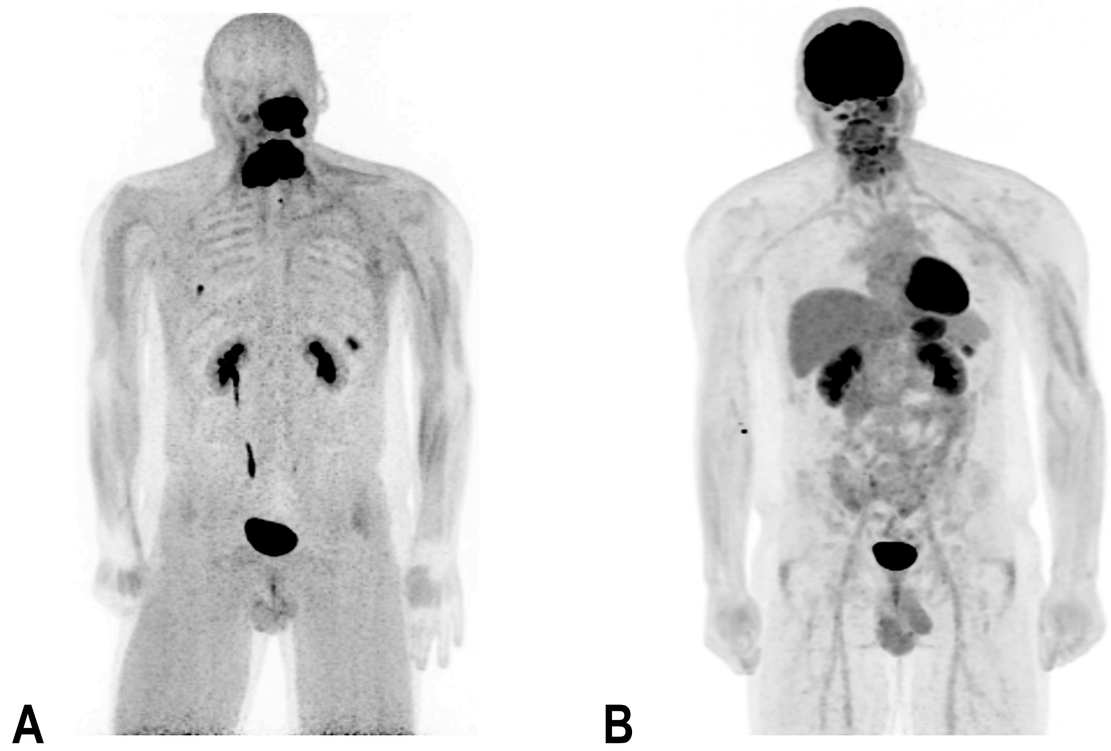


Figure 1. Maximum-intensity-projection (MIP) images obtained from **68Ga-FAPI PET (A)** and **18F-FDG PET (B)**, both acquired 60 minutes post-injection. The lesion-to-background contrast is better with FAPI than with FDG.

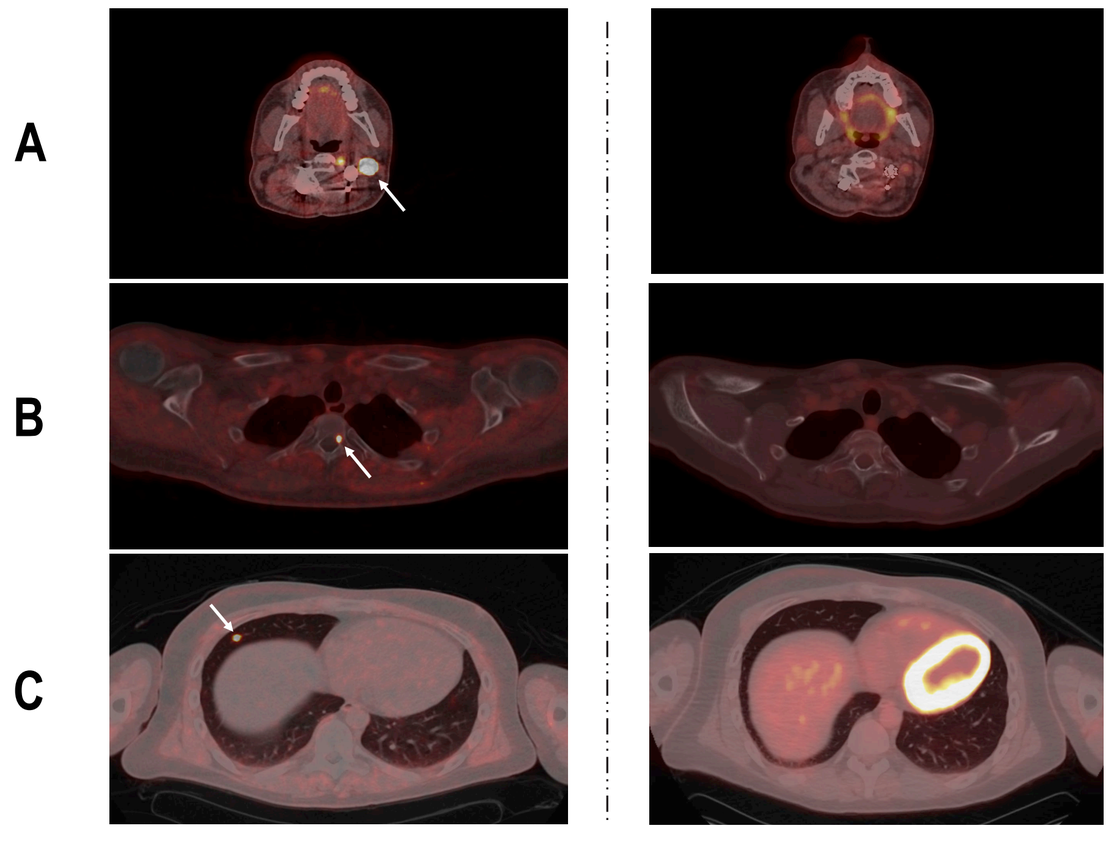


Figure 2. Axial PET/CT fusion images obtained from **68Ga-FAPI PET (left column)** and **18F-FDG PET (right column)**, illustrating three lesions that are better characterized with FAPI: the **left cervical adenopathy lateral to C3** (A; SUVmax 56.4), the **T3 bone metastasis** (B; SUVmax 12), and the **right anterior basal pulmonary nodule** (C; SUVmax 10.3).

DISCUSSION

- ❖68Ga-FAPI PET not only detected all the lesions found on the other modalities, but also allowed **better characterization of two additional lesions** :
  - ➢Left cervical lymphadenopathy lateral to C3 (SUVmax of 56.4);
  - ➢Vertebral metastasis at T3 (SUVmax of 12).
- ❖**No dedifferentiated disease** : absence of any FDG-positive/FAPI-negative lesion, preserving the therapeutic potential of a treatment targeting FAP.
- ❖**Eligibility for 90Y-FAPI confirmed** : all lesions show a SUVmax of at least 10 (required threshold: > 50%).

CONCLUSION

- ❖First clinical use of 68Ga-FAPI PET in Canada, demonstrating the excellent avidity of the metastatic lesions of a solitary fibrous tumor.
- ❖Superior lesion detection compared to FDG, PSMA, and MRI.
- ❖Absence of dedifferentiation and high SUVmax values → eligibility confirmed for 90Y-FAPI therapy, which represents our next therapeutic step!

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