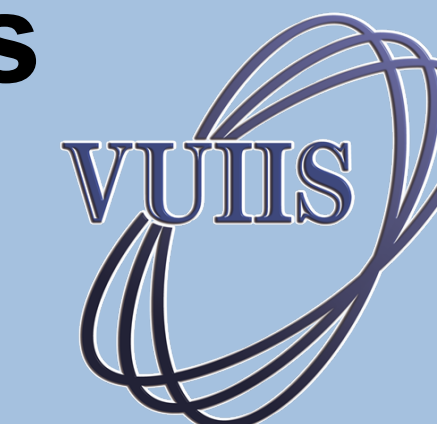




16α-[18F]-fluoro-17β-estradiol (¹⁸F-FES) PET/CT Imaging of Estrogen Receptor Activity in Desmoid Tumors

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BACKGROUND:

Desmoid tumors are nonmalignant but locally aggressive fibroblastic neoplasms that express beta estrogen receptors (ER-β) to varying degrees. There are different treatment options but all have drawbacks. Only about half of patients respond to medications targeted at the estrogen receptor site. The recurrence rate is 30-50% following surgical resection, and they often behave more aggressively when they recur. Chemotherapy carries the same risks as for any other neoplasm. There are no predictive models to guide clinicians in deciding which therapy to pursue.

16α-[18F]-fluoro-17β-estradiol (¹⁸F-FES) is a radioisotope traditionally used in breast cancer research, where it has been shown to predict response to anti-estrogen medications such as Tamoxifen. In a patient with ¹⁸F-FES-avid breast cancer, the likelihood of response to anti-estrogen medication is much higher than in patients with ¹⁸F-FES-negative disease.

AIM:

This is a pilot study to determine if there is variability in the avidity of desmoid tumors when imaged by ¹⁸F-FES, and if the tracer uptake correlates with ER-β activity as determined by immunohistochemistry staining. If imaging provides novel information about the ER-β expression, the next step would be to see if this activity can be used to predict response to anti-estrogen medications, as it does for breast cancer.

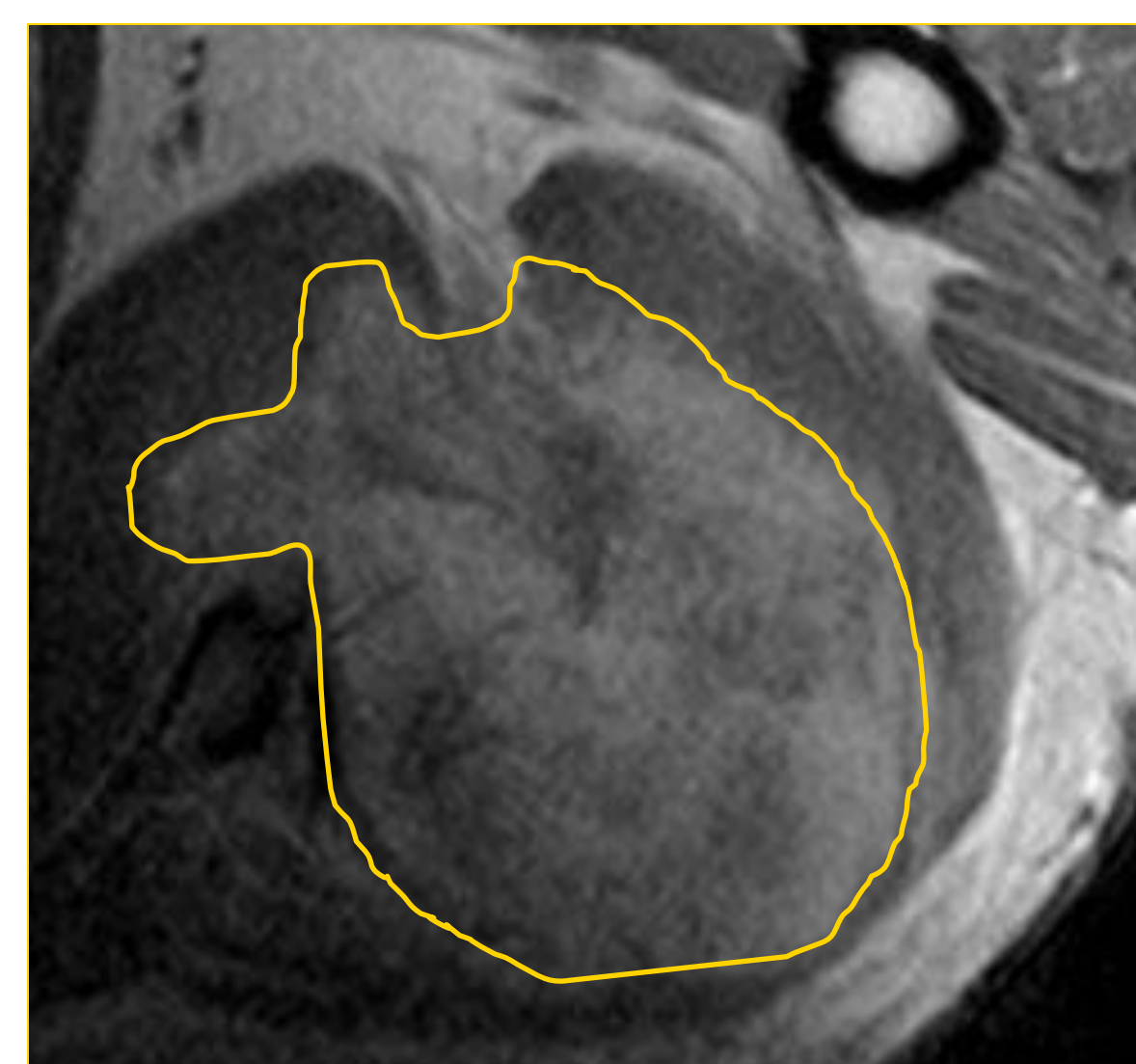
References:
Bocale, D, et al. Anti-Oestrogen Therapy in the Treatment of Desmoid Tumours: A Systematic Review. *Colorectal Disease* 13: e388-e395, 2011
Clark, A, et al. Using Nuclear Medicine Imaging in Clinical Practice: Update on PET to Guide Treatment of Patients with Metastatic Breast Cancer. *Oncology* 28: online, 2014.

References continued under right column.

Patient 1: Left infraspinatus desmoid

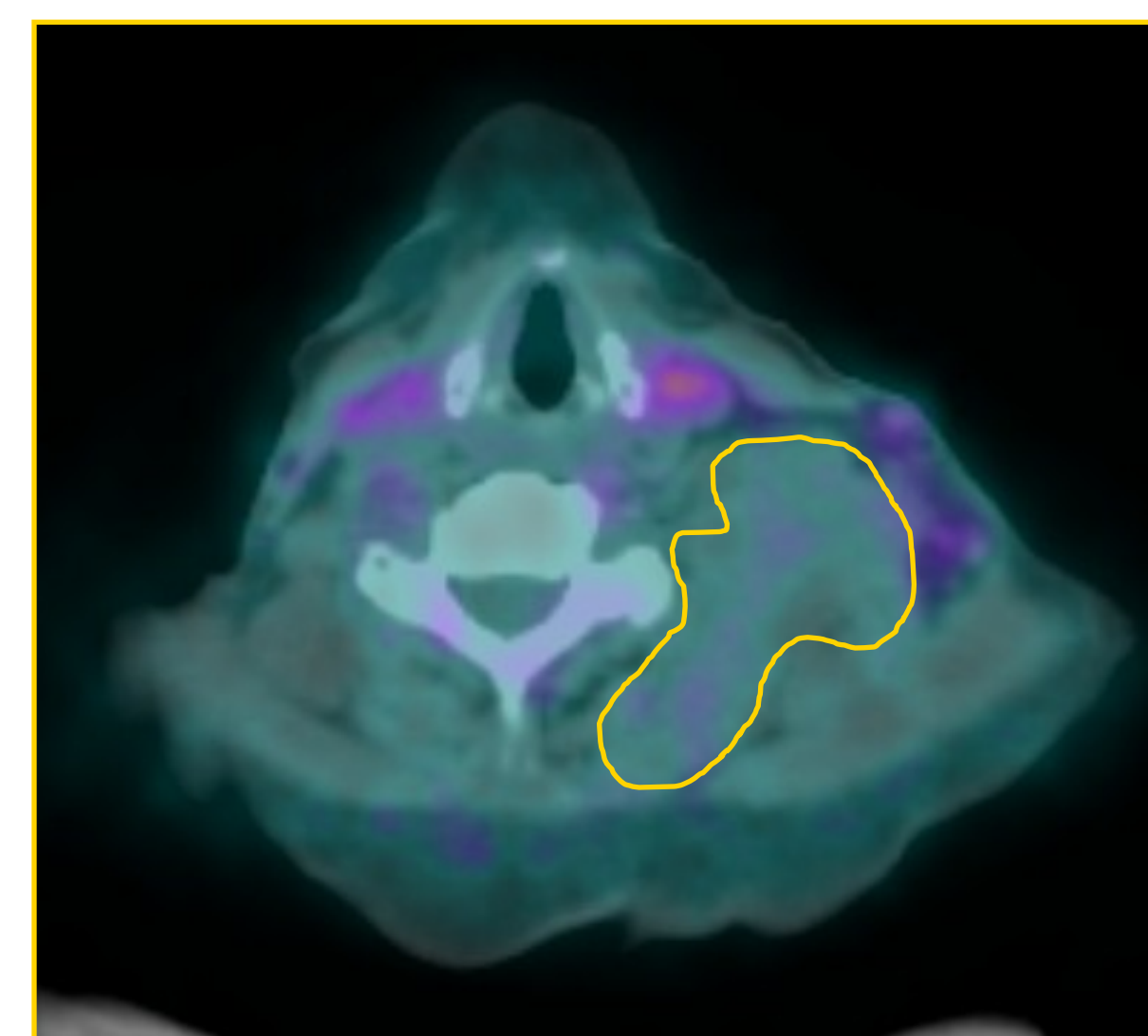


Fused axial ¹⁸F-FES PET/CT

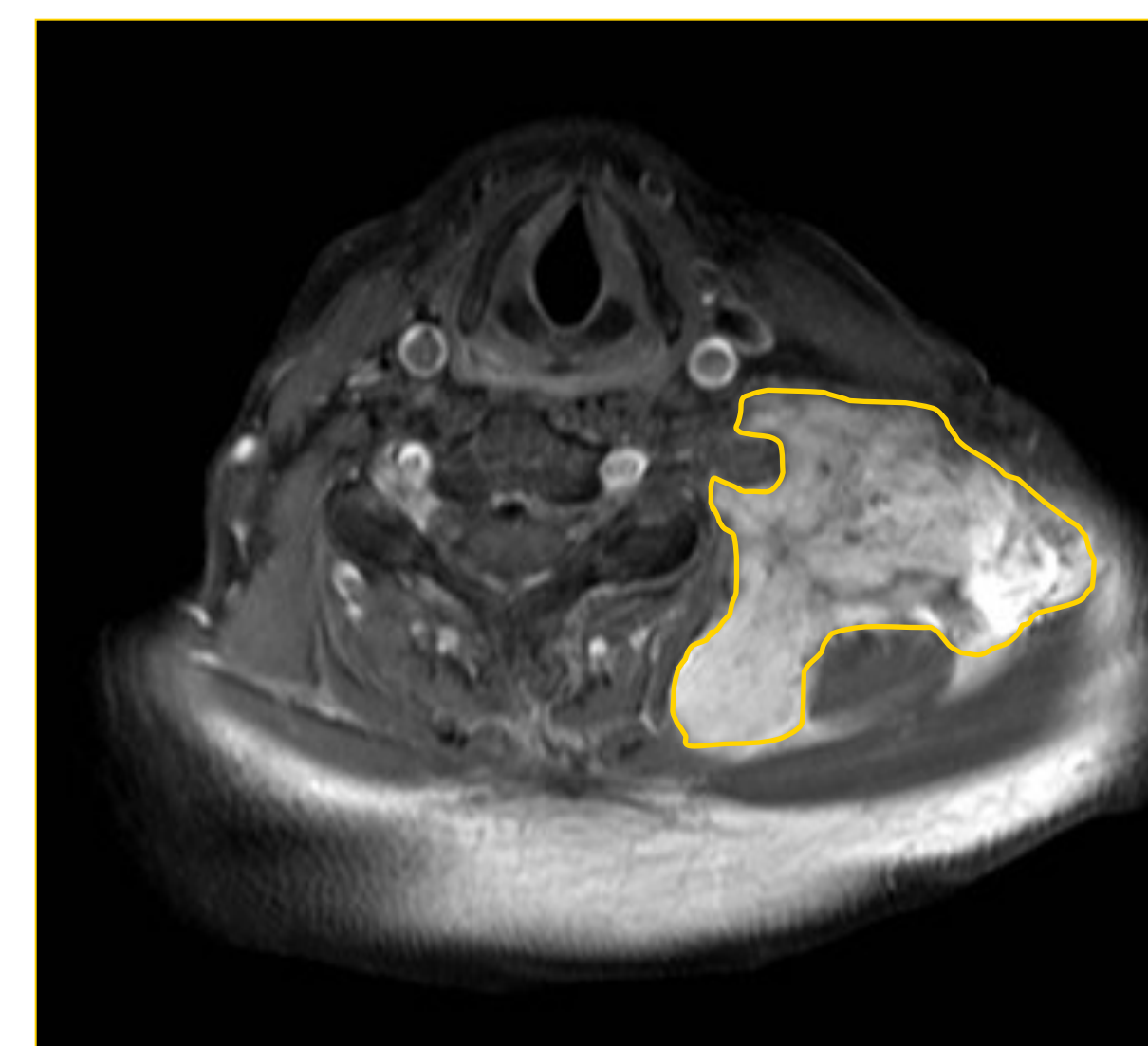


T1 post-contrast axial MR

Patient 2: Left cervical desmoid



Fused axial ¹⁸F-FES PET/CT



T1 post-contrast axial MR

METHODS:

Ten patients will undergo PET/CT imaging with ¹⁸F-FES using a dedicated PET/CT scanner, 6.0 mCi administered activity, and 3 minutes per bed position. ¹⁸F-FES uptake ratio will be calculated based on the maximum and average standard uptake values of the tumor as compared to mean uptake in the aorta, which will serve as the internal standard. This will then be compared to the ER-β activity expression as determined by immunohistochemistry staining of tissue acquired during clinical biopsy and resection procedures.

RESULTS TO DATE:

Two patients have been imaged, shown to the left. Immunohistochemistry staining is pending. Both tumors demonstrate heterogeneous uptake. The first patient's tumor demonstrated a much higher maximum SUV but a similar mean SUV. SUV values are listed below:

	Patient 1	Patient 2
SUVmax	1.63	0.95
SUVmean	0.59	0.55
SUVmax:Aorta	1.08	0.69
SUVmean:Aorta	0.39	0.40

References cont'd:
Deyrup, A, et al. Estrogen Receptor-β Expression in Extraabdominal Fibromatoses. *Cancer* 106: 208-213, 2006.
Gronchi, A, et al. Sporadic Desmoid-Type Fibromatosis: A Stepwise Approach to a Non-Metastasising Neoplasm – A Position Paper from the Italian and the French Sarcoma Group. *Annals of Oncology* 25: 578-583, 2014.
Kasper, B, et al. Desmoid Tumors: Clinical Features and Treatment Options for Advanced Disease. *Oncologist* 16: 682-693, 2011.