

Supplemental TABLE 1

PET/CT results in function of biology, history, localization and histopathology

	Ca	P	PTH	History	Previous imaging	¹¹C-MET	¹⁸F-FCH_E	¹⁸F-FCH_L	Surgical localization	Histology
P1	2.76	0.68	95			2	2	2	P4R	PA
P2	2.66	0.92	53			0	2	2		
P3	2.79	0.9	140		US	0	0	0		
P4	2.58	0.87	71	GH macroadenoma	US	2/1/0/1	2/2/1/1	2/2/1/1	P3L	PH
P5	2.85	0.73	42	fracture	US/Neck CT	2	2	2	P4L	PA
P6	2.64	0.52	72	RC/hypercalciuria	US/Chest CT	2/1	2/2	2/2		
P7	2.81	0.87	49		US/Neck MRI	1	2	2	P3R	PA
P8†	3.0	NA	163	surgery	US	2	2	2	P3L	PA
P9*	2.57	0.87	48	surgery/RC	US	0	2	2	P3R	PH
P10	2.6	1.1	92	OP/hypercalciuria	US	0/0	2/1	2/1		
P11	2.72	0.56	71		US	1	1	1		
P12	2.57	0.55	61	CM/Crohn	US	0	2	2		
P13	2.94	0.36	150	RC/OP/hypercalciuria	US	2	2	2	P4R	PA
P14	2.75	0.78	29			0	0	0		
P15	2.64	0.53	46	surgery	US	0	0	0	P3R	PA
P17	2.97	0.75	160	hypercalciuria		2	2	0	Intrathyroidal IR	PA
P20	2.62	0.71	50	hypercalciuria/Basedow	US	2	2	2	P3L	PA
P21*	2.88	0.86	81	RC/OP/hypercalciuria	US	2	2	2	P3L (+P4)	PA (+ 2 PH)
P22	3.23	0.63	530			2	2	2	P3R	PA
P23	2.6	0.88	73	OP/hypercalciuria	US/Neck CT	1	2	2		
P24	2.56	0.99	43	Thyroid surgery		0	1	1		
P25	2.88	0.99	142		US	1	2	2	ectopic	PA (+ PH)
P26	2.67	0.63	52	RC/OP/Hashimoto	US	1	2	2	P3L	PH
P27	2.85	0.95	40		US	1	2	2	P3R	PA
P28	2.64	0.85	88	RC/hypercalciuria	US	1	2	2	P3R	PA
P29	2.7	0.87	72	Hashimoto	US/Neck CT	1	1	2	P3L	PA
P30	2.82	0.74	54	hypercalciuria		2/2/0	2/2/0	2/2/1		

P32	2.77	0.45	54	OP		2	2	2	P4L	PA
P33	2.74	0.73	70		US	2	2	2	P3L	PA
P34	2.65	0.70	60	CM	US/Neck CT	0	0	0		
P35	2.51	0.77	56	hypercalciuria	US/Neck CT	0	0	0		
P36	2.59	0.73	150	OP		2	2	2		
P37	3.35	0.66	62	OP/pancreatitis	NA	1	2	2	ectopic	PA
P38	2.87	0.44	100		US	2	2	2	P3R	PCa
P39	2.54	0.72	64	OP	US	2	2	2		
P40	2.47	0.69	73	OP/hypercalciuria	US/Neck CT	0	1	1		
P41	2.51	0.94	78	CM/hypercalciuria	US	0	0	0		
P42	2.82	0.96	77			0	0	0		
P43	2.66	0.99	244		NA	2/1	2/2	2/2		
P44	2.50	0.92	40	CM	US	1	2	2	P3R	PA
P45	2.67	0.69	62	HIV	US	0	0	0		
P46	2.67	0.67	96	surgery	NA	2	2	2		
P47	2.76	0.64	106	OP/hypercalciuria/crohn	US	0	0	0		
P49	2.67	0.67	79	Surgery/OP/pheochromocytoma		2	2	2	P4R	PA
P50*	2.63	0.59	114		Chest CT	2/0/0	2/2/2	2/2/2	P3R/ P4R/ P4L	3 PA
P51	2.71	0.82	101	surgery	US	2	2	2	P3R	Normal gland
P52	2.59	0.7	116	hypercalciuria		2	2	2		
P53	2.65	1.05	49	surgery		2	2	2		
P54	2.65	0.35	279	CM/breast-ovarian cancer	US	2/2/2	2/2/2	2/2/2	P3L/ Intrathyroidal IL	bifocal PCa/ unexplored R
P55	2.77	0.70	55	hypercalciuria	NA	0	1	1		
P56	2.65	0.84	133		US	1	2	2		
P57	2.78	0.77	51		US	2	2	2		
P58	2.62	0.69	35	RC/OP	US	1	1	0		

Px=patient x, Ca=serum calcium, P=serum phosphorus, PTH=parathyroid hormone, GH= growth hormone, RC=renal colic, CM=calcimimetic drug, surgery=parathyroidectomy, OP=osteopenia/-porosis, US=neck ultrasonography, CT= CT scanner, MRI=magnetic resonance imaging, NA=not available, ¹¹C-MET=¹¹C-Methionine, ¹⁸F-FCH_{E/L}=¹⁸F-Fluorocholine early/late, Scores 0=negative; 1=inconclusive; 2=positive, P3=inferior parathyroid gland, P4=superior parathyroid gland, R=right, L=left, PA=parathyroid adenoma, PH=parathyroid hyperplasia, PCa=parathyroid carcinoma

* Patients with familial context of multiple endocrine neoplasia or other rare syndrome

Supplemental TABLE 2
Contingency Tables for ¹⁸F-FCH vs. Histology and ¹¹C-MET vs. Histology

Per lesion resected	Positive ¹⁸ F-FCH	Negative ¹⁸ F-FCH	Total ¹⁸ F-FCH
PA	21	1	22
PH	3*	3	6
PCa	3	0	3
Total	27	4	31

* mismatch in location for a lesion

Sensitivity = 26 / 31 = 84%

PPV = 26 / 29 (FP: 1 mismatch localization, 1 normal gland, 1 thyroid nodule) = 89.6%

Specificity, NPV, Accuracy: NA

Per lesion resected	Positive ¹¹ C-MET	Negative ¹¹ C-MET	Total ¹¹ C-MET
PA	12	10	22
PH	1	5	6
PCa	3	0	3
Total	16	15	31

Sensitivity = 16 / 16 + 15 = 52%

PPV = 16 / 16 + 1 (normal gland) = 94%

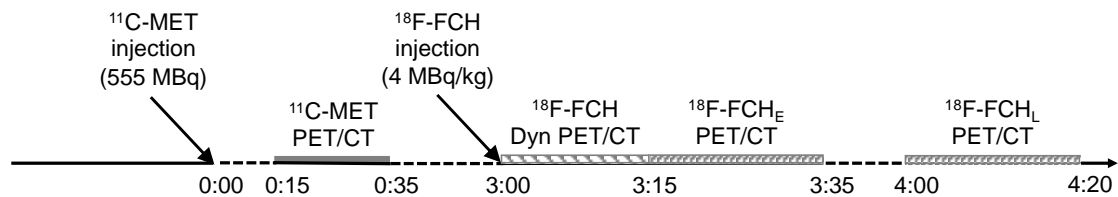
Specificity, NPV, Accuracy: NA

PA=parathyroid adenoma, PH=parathyroid hyperplasia, PCa=parathyroid carcinoma, ¹⁸F-FCH=¹⁸F-Fluorocholine, ¹¹C-MET=¹¹C-Methionine, NA=non applicable

Supplemental TABLE 3

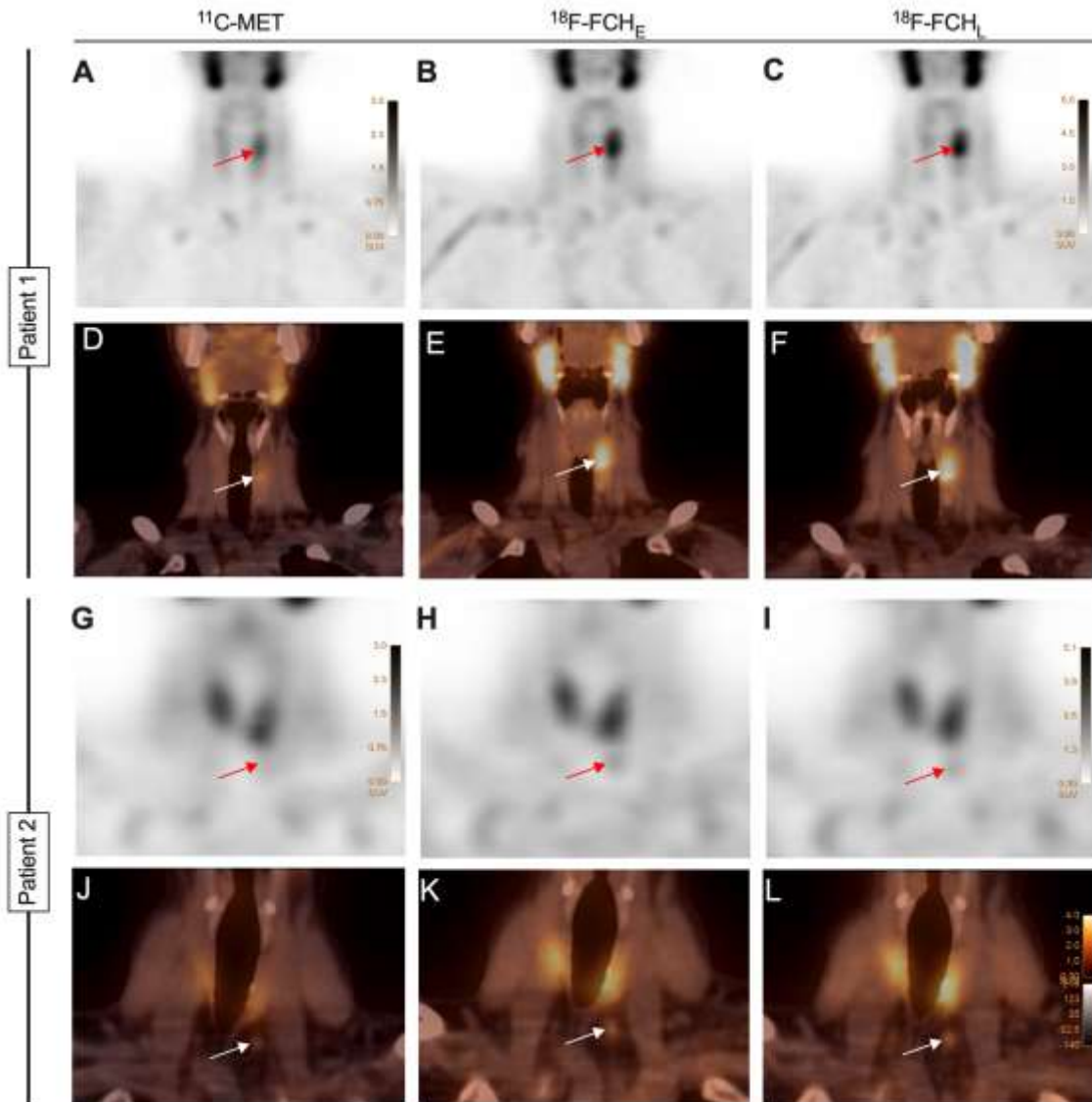
Pitfalls in PET/CT	¹¹C-MET	¹⁸F-FCH
Lymph nodes	+	+
Mediastinal tumor	+	+
Thyroid nodule		+
Oesophagus	+	

¹¹C-MET=¹¹C-Methionine; ¹⁸F-FCH=¹⁸F-Fluorocholine



Supplemental FIGURE 1 – One-day imaging timeline

Dyn=dynamic, $^{18}\text{F-FCH}_{(E/L)}$ = $^{18}\text{F-Fluorocholine}$ (early/late), MBq=Megabecquerel, $^{11}\text{C-MET}$ = $^{11}\text{C-Methionine}$

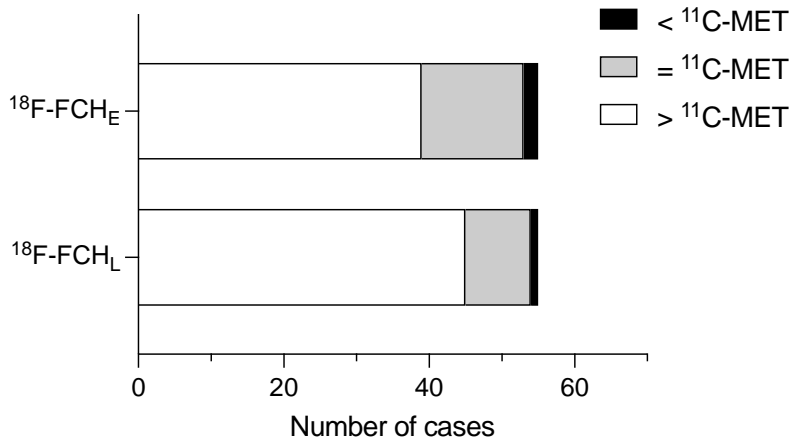


Supplemental FIGURE 2 –

Patient 1: Coronal PET images (A-D) $^{11}\text{C-MET}$ (B-E) $^{18}\text{F-FCH}_E$ and (C-F) $^{18}\text{F-FCH}_L$ in a 52 y-old female patient with pHPT and negative MIBI SPECT/CT. Moderate $^{11}\text{C-MET}$ uptake and intense $^{18}\text{F-FCH}$ uptake (arrows) of a voluminous nodule behind the upper left pole, with a slightly better contrast on late $^{18}\text{F-FCH}$ images.

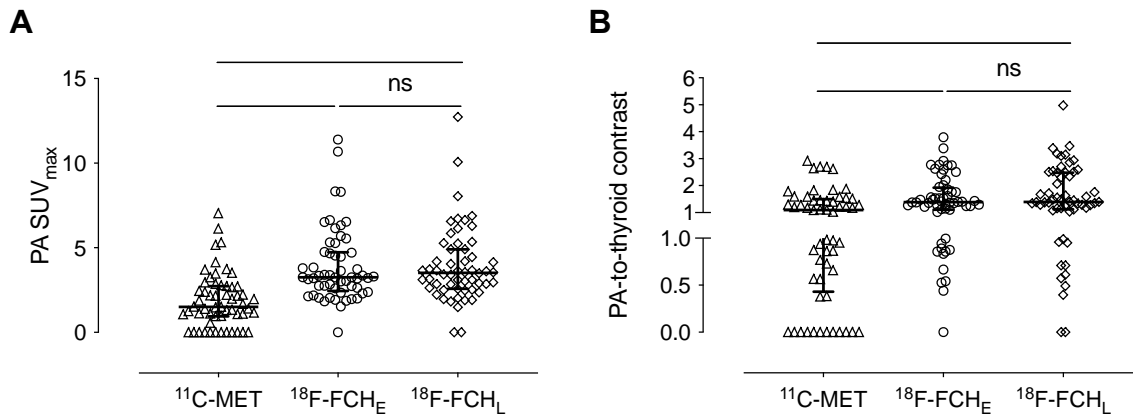
Patient 2: (G) $^{11}\text{C-MET}$ compared to (H-I) $^{18}\text{F-FCH}_E$ and $^{18}\text{F-FCH}_L$ and respective (J-K-L) fusion images for detection of parathyroid lesion of a 68 y-old female patient with pHPT with negative MIBI SPECT/CT. Negative $^{11}\text{C-MET}$ -PET/CT but positive early and late $^{18}\text{F-FCH}$ -PET/CT.

$^{18}\text{F-FCH}_{(E/L)}$ = $^{18}\text{F-Fluorocholine}$ (early/late), $^{11}\text{C-MET}$ = $^{11}\text{C-Methionine}$, MIBI = $^{99\text{m}}\text{Tc-sestaMIBI}$ SPECT scintigraphy, pHPT = hyperparathyroidism



Supplemental FIGURE 3 – Visual comparison to $^{11}\text{C-MET}$ uptake on $^{18}\text{F-FCH}_E$ vs. $^{18}\text{F-FCH}_L$

$^{18}\text{F-FCH}_{(E/L)}$ = $^{18}\text{F-Fluorocholine}$ (early/late), $^{11}\text{C-MET}$ = $^{11}\text{C-Methionine}$



Supplemental FIGURE 4 – Distribution of SUVmax PA and PA/Thyroid

¹⁸F-FCH_(E/L)= ¹⁸F-Fluorocholeline(early/late), ¹¹C-MET=¹¹C-Methionine, PA=parathyroid lesion
 ****, p<0.0001