

**Supplemental Table 1. Histology detail**

<b>Histology</b>	<b>Overall (n=47)</b>
Angiosarcoma	1 (2.0%)
Chordoma	6 (12.0%)
Dedifferentiated chondrosarcoma	1 (2.0%)
Endometrial stromal sarcoma	2 (4.0%)
Ewing Sarcoma	2 (4.0%)
Gastrointestinal stromal tumor	2 (4.0%)
Leiomyosarcoma	4 (8.0%)
Low-grade myofibroblastic sarcoma	1 (2.0%)
Malignant solitary fibrous tumor	2 (4.0%)
Myxoid liposarcoma	3 (6.0%)
Malignant peripheral nerve sheath tumor	1 (2.0%)
Mixed Müllerian tumor	1 (2.0%)
Myxofibrosarcoma	2 (4.0%)
Undifferentiated soft tissue sarcoma (NOS, round cell, UPS)	6 (12.0%)
Undifferentiated bone sarcoma	2 (4.0%)
Osteosarcoma	8 (16.0%)
Rhabdomyosarcoma of the bone	1 (2.0%)
Synovialsarcoma	2 (4.0%)

**Supplemental Table 2. FAPI uptake vs IHC on a per patient basis.** IHC scoring: 0 = no expression (<1%), 1+ = 1-10 %, 2+ = 11-49%, 3+ = ≥50% FAP-positive cells.

	<b>IHC 0 (n=8)</b>	<b>IHC 1 (n=4)</b>	<b>IHC 2 (n=3)</b>	<b>IHC 3 (n=13)</b>	<b>Overall (n=47)</b>
<b>SUV<sub>max</sub> tumor</b>					
Mean (SD)	12.0 (10.2)	13.5 (12.0)	12.8 (2.87)	23.1 (15.4)	15.2 (11.7)
Median [Min, Max]	9.40 [3.90, 32.6]	9.05 [4.70, 31.2]	14.2 [9.50, 14.7]	22.8 [3.20, 61.9]	10.8 [3.20, 61.9]

**Supplemental Table 3. FAPI and FDG uptake for high versus low grade tumors.** In 7 patients tumor grading was not applicable.

	high grade (n=35)	low grade (n=5)	not applicable (n=7)	Overall (n=47)
<b>FAPI</b>				
Mean (SD)	14.2 (12.0)	21.1 (12.5)	15.8 (9.52)	15.2 (11.7)
Median [Min, Max]	9.50 [3.60, 61.9]	18.0 [4.70, 34.5]	12.4 [3.20, 27.8]	10.8 [3.20, 61.9]
<b>FDG</b>				
Mean (SD)	13.6 (12.8)	9.10 (6.77)	7.55 (5.67)	12.2 (11.6)
Median [Min, Max]	11.8 [1.80, 64.6]	7.60 [3.80, 20.5]	6.70 [1.20, 17.0]	9.60 [1.20, 64.6]

**Supplemental Table 4. Tracer-to-Background**

	<b>FAPI (n=47)</b>	<b>FDG (n=43)</b>
<b>SUV<sub>max</sub> tumor</b>		
Mean (SD)	15.2 (11.7)	12.2 (11.6)
Median [Min, Max]	10.8 [3.20, 61.9]	9.60 [1.20, 64.6]
<b>TBR liver</b>		
Mean (SD)	18.0 (14.8)	7.20 (8.22)
Median [Min, Max]	14.1 [2.83, 78.0]	4.65 [0.800, 43.1]
<b>TBR blood pool</b>		
Mean (SD)	10.5 (8.39)	8.28 (8.10)
Median [Min, Max]	7.47 [1.89, 34.4]	5.68 [0.947, 38.0]
<b>TBR muscle</b>		
Mean (SD)	11.8 (9.76)	24.3 (29.3)
Median [Min, Max]	7.50 [2.46, 41.3]	16.0 [2.0 to162.0]

TBR liver (SUV<sub>max</sub> tumor/ SUV<sub>mean</sub> liver); TBR blood pool (SUV<sub>max</sub> tumor/ SUV<sub>mean</sub> blood pool); TBR muscle (SUV<sub>max</sub> tumor/ SUV<sub>mean</sub> muscle)

**Supplemental Table 5.** SE, SD, PPV and NPV on a per patient basis for histopathologically confirmed lesions.

	Histopathol. confirmed	Histopathol. ruled out	Total		
<b>PET positive</b>	<b>27</b>	<b>0</b>	<b>27</b>	PPV	100 %
<b>PET negative</b>	<b>1</b>	<b>1</b>	<b>2</b>	NPV	50 %
<b>Total</b>	<b>28</b>	<b>1</b>	<b>29</b>		
	Sensitivity 96 %	Specificity 100 %			

**Supplemental Table 6.** Lesion number on a per-patient and per-region basis.

	PET-positive lesions, No.	
	FAPI (n=43)	FDG (n=43)
<b>Per-patient basis</b>	310	345
<b>Per-region basis</b>		
Primary	46	48
Local nodal	10	13
Distant nodal	19	35
Lung	94	110
Bone	56	40
Other	85	99

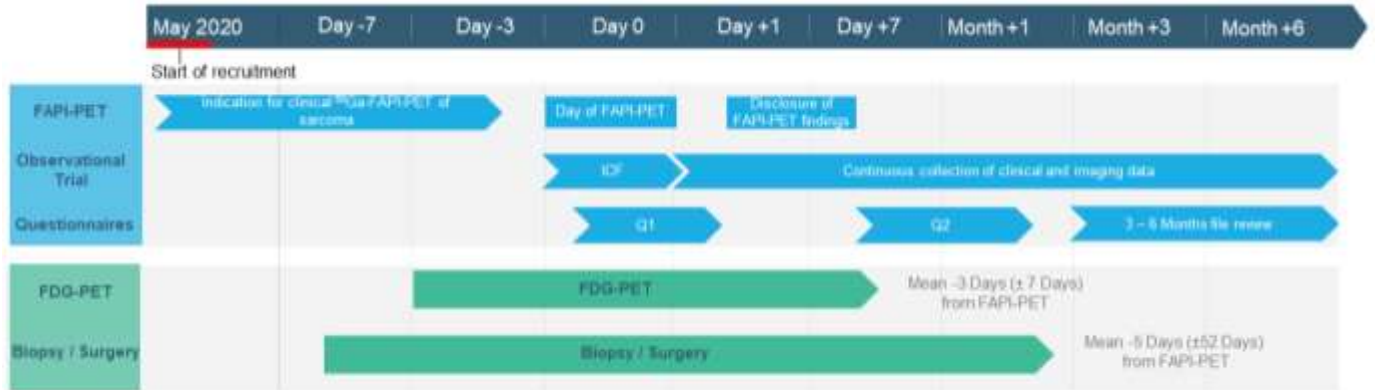
Abbreviations: PET, positron emission tomography; FAPI, fibroblast-activation protein inhibitor; FDG, fluorodeoxyglucose

**Supplemental Table 7. List of patients with major change in treatment.**

Patient no.	Intended treatment	Management towards	Change in stage by FAPI-PET	Disease extent
1	Radio-/Chemotherapy	Best supportive care	Upstaged local to metastatic	increase
2	Local radiochemotherapy	Systemic therapy	No change Metastatic to metastatic	decrease
3	Local radiochemotherapy	Systemic therapy	Upstaged No disease to local disease	increase
4	Neoadjuvant chemotherapy and surgery	Systemic therapy	Downstaged Local to no disease	decrease
5	Radio-/Chemotherapy	Active surveillance	No change Local to local	equal
6	Chemotherapy	Local therapy (radiation therapy)	No change Metastatic to metastatic	increase
7	Chemotherapy and surgery	Best supportive care	No change Metastatic to metastatic	equal

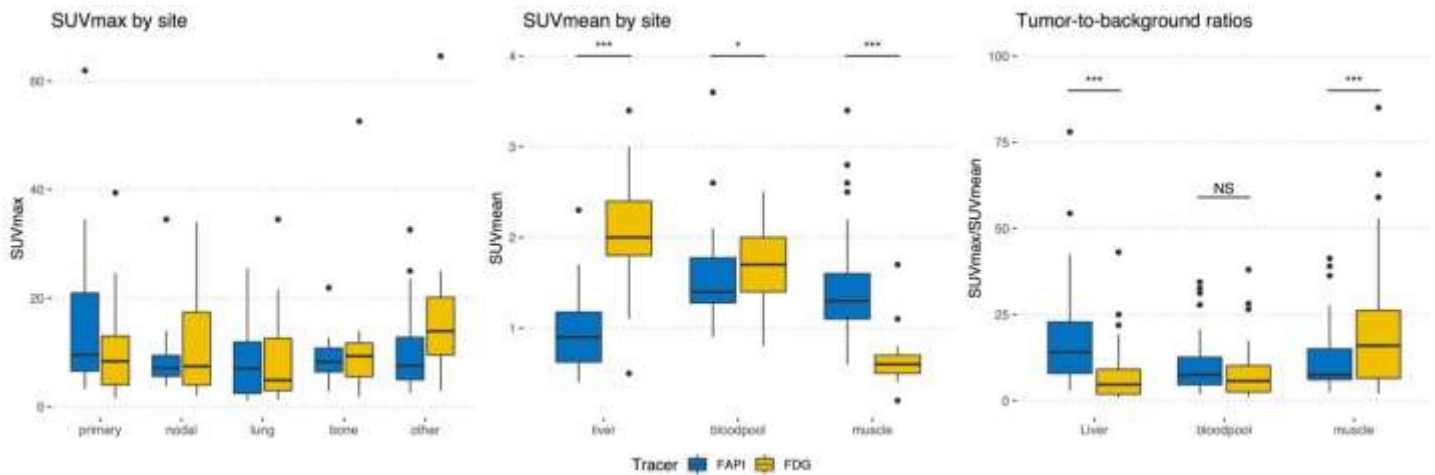
# Supplemental Figures

**Supplemental Figure 1.** Timeline of investigations. Study timelines are shown in blue. Procedures as per clinical routine are shown in green.





**Supplemental Figure 2. Mean and maximum organ uptake and tumor to background ratios (TBRs).** Left diagram shows  $SUV_{max}$  for FAPI and FDG in tumor lesions in the predefined regions. Further  $SUV_{mean}$  for background tracer uptake shows lower background  $SUV_{mean}$  for FAPI in liver and blood pool, but higher  $SUV_{mean}$  in muscle (middle diagram). The right diagram shows higher TBRs for FAPI vs FDG normalized by liver uptake but lower TBR by normalization to muscle uptake.



**Supplemental Spreadsheet 1.** Reading Raw Data. Excel-spreadsheet of reading raw data for Reader 1 FAPI-PET interpretation.

**Supplemental Spreadsheet 2.** Reading Raw Data. Excel-spreadsheet of reading raw data for Reader 1 FDG-PET interpretation.

**Supplemental Spreadsheet 3.** Reading Raw Data. Excel-spreadsheet of reading raw data for Reader 2 FAPI-PET interpretation.

**Supplemental Spreadsheet 4.** Reading Raw Data. Excel-spreadsheet of reading raw data for Reader 2 FDG-PET interpretation.