

**Supplement Figure 1 – Patient No 1**: 22 year old male patient with metastasized osteosarcoma who has progressed in seven lines of chemotherapy. Pretherapeutic MIP of <sup>18</sup>FDG-PET (**A**) and <sup>68</sup>Ga-FAPI-46 PET (**B**) scans are shown. Moreover, Bremstrahlungsscintigraphy 0.5 h p.i. (**C**) and post-treatment <sup>90</sup>Y-FAPI-46 PET 3.5 + 24 h p.i. (**D**) are displayed. **E** shows <sup>18</sup>FDG PET 14 days after RLT. Although, a progressive metabolic disease was observed, a second cycle was applied since RECIST showed stable disease and lack of other treatment options. The patient, with very advanced tumor disease, died shortly after second cycle due to tumor-related acute respiratory distress tumor, which was 24 days after the first cycle. A new thrombocytopenia grade 3 was observed.



**Supplement Figure 2 – Patient No 2:** 66 year old male patient with locally relapsed and metastasized chordoma, suffering reduced performance status (ECOG 3) and severe tumor pain. He has progressed in two lines of therapy, without further evidence based therapy options. Pretherapeutic MIP of <sup>18</sup>FDG-PET (**A**) and <sup>68</sup>Ga-FAPI-46 PET (**B**) scans are shown. Moreover, bremstrahlungsscintigraphy 0.5 h p.i. (**C**). Post-treatment <sup>90</sup>Y-FAPI-46 PET could not be performed because of tumor pain. **E** shows <sup>18</sup>FDG PET 2 weeks after first cycle RLT with tumor progression. Therefore, a second cycle was not applied and a subsequent therapy with immune checkpoint inhibitor nivolumab as compassionate use was started. He did not show any G3/4 adverse events and died 67 days after first cycle RLT.



**Supplement Figure 3 – Patient No 3:** 54 year old female patient with metastasized fibrosarcoma who has progressed in six lines of chemotherapy. Pretherapeutic MIP of <sup>18</sup>FDG-PET (**A**) and <sup>68</sup>Ga-FAPI-46 PET (**B**) scans are shown. Moreover, bremstrahlungsscintigraphy 0.5 h p.i. (**C**) and post-treatment <sup>90</sup>Y-FAPI-46 PET 3 + 18 h p.i. (**D**) are displayed. **E** shows <sup>18</sup>FDG-PET 3 months after first cycle RLT. Showing stable disease, the patient received so far 3 cycles RLT. She did not show any G3/4 adverse events during follow-up time of 100 days. **F** Shows regression of a target lesion -28% following first cycle of <sup>90</sup>Y-FAPI-46



**Supplement Figure 4 – Patient No 4:** 57 year old female patient with metastasized pancreatic ductal adenocarcinoma, who had progressed in two lines of chemotherapy. She was not eligible for further chemotherapy, due to reduced performance status (ECOG 3), at time point of evaluation for RLT. Pretherapeutic MIP of <sup>18</sup>FDG-PET (**A**) and <sup>68</sup>Ga-FAPI-46 PET (**B**) scans are shown. Moreover, bremstrahlungsscintigraphy 19 h p.i. did not show focal uptake. (**C**). Post-treatment <sup>90</sup>Y-FAPI-46 PET could not be performed because of reduced performance status. **D** shows <sup>18</sup>FDG PET 2 weeks after first cycle RLT with tumor progression. Given missing uptake in post-treatment scan and rapid progression, a second cycle was not applied. Due to highly symptomatic tumor progression one cycle chemotherapy with cisplatin was applied as subsequent treatment. G3/4 adverse events occurred due to tumor progression and subsequent therapy. The patient died 57 days after first cycle of RLT.



**Supplement Figure 5 – Patient No 5:** 61 year old female patient with metastasized pancreatic ductal adenocarcinoma who has progressed in nine lines of chemotherapy. Pretherapeutic MIP of FDG-PET (**A**) and <sup>68</sup>Ga-FAPI-46 PET (**B**) scans are shown. Moreover, bremstrahlungsscintigraphy 0.5 h p.i. (**C**) are displayed. Post-treatment <sup>90</sup>Y-FAPI-46 PET could not be performed because of reduced performance status. (**D**) shows <sup>18</sup>FDG-PET 2 weeks after first cycle RLT and concomitant treatment with the MEK inhibitor trametinib as compassionate use. Due to tumor progression, a second cycle was not applied. Trametinib was continued. G3/4 adverse events occurred later due to tumor progression. She died 41 days after first cycle RLT.



Supplement Figure 6 – Patient No 6: 56 year old female patient with metastasized pancreatic ductal adenocarcinoma, who has progressed in six lines of chemotherapy. Pretherapeutic MIP of <sup>18</sup>FDG-PET <sup>68</sup>Ga-FAPI-46 (**A**) and PET **(B)** scans are shown. Moreover, bremstrahlungsscintigraphy 0.5 h p.i. (C) and post-treatment <sup>90</sup>Y-FAPI-46 PET 0.5 + 3 + 22 h p.i. (D) are displayed. A FDG PET was not performed after RLT for this patient given low uptake in baseline scan. Concomitant treatment with the tyrosine kinase inhibitor afatinib was continued. CT scans displayed stable disease. G3/4 adverse event occurred later due to tumor progression. The patient died 105 days after first cycle of RLT.



**Supplement Figure 7 – Patient No 7:** 63 year old female patient with metastasized gastrointestinal neuroectodermal tumor (GNET) who has progressed in 3 lines of chemotherapy. Pretherapeutic MIP of <sup>18</sup>FDG-PET (**A**) and <sup>68</sup>Ga-FAPI-46 PET (**B**) scans are shown. The patient had insufficient retention of the radioligand as determined by bremstrahlungsscintigraphy 0.5 h p.i. (**C**) and post-treatment <sup>90</sup>Y-FAPI-46 PET 3 + 24 h p.i. (**D**). Therefore, no second cycle RLT was applied and no <sup>18</sup>FDG-PET was performed. A subsequent therapy with immune checkpoint inhibitor nivolumab as compassionate use was started. She did not show any G3/4 adverse events during follow-up time of 44 days after first cycle RLT.



Supplement Figure 8 – Patient No 8: 61 year old male patient with metastasized conventional chondrosarcoma who has progressed in two lines of chemotherapy. Pretherapeutic MIP of <sup>68</sup>Ga-FAPI-46 <sup>18</sup>FDG-PET (**A**) and PET **(B)** scans are shown. Moreover, bremstrahlungsscintigraphy 0.5 h p.i. (C) and post-treatment <sup>90</sup>Y-FAPI-46 PET (D) are displayed. **E** shows <sup>18</sup>FDG-PET 2 weeks after first cycle RLT with tumor progression. Due to lack of further evidence base therapies and clinical benefit, a second cycle was applied and follow-up is pending. No G3/4 adverse events occurred during follow up of 36 days at time of submission.



**Supplement Figure 9 – Patient No 9:** 56 year old male patient with metastasized spindle cell sarcoma who has progressed in six lines of chemotherapy. Pretherapeutic MIP of <sup>18</sup>FDG-PET (**A**) and <sup>68</sup>Ga-FAPI-46 PET (**B**) scans are shown. Moreover, bremstrahlungsscintigraphy 0.5 h p.i. (**C**) and post-treatment <sup>90</sup>Y-FAPI-46 PET 4 + 22 + 42h p.i. (**D**) are displayed. **E** shows <sup>18</sup>FDG-PET 2 weeks after RLT with partial metabolic response. Therefore, a second cycle was applied. No G3/4 adverse events occurred during follow up of 36 days at time of submission.



Supplement Figure 10: Overview laboratory parameters with individual time scale for each patient

\* 90Y-FAPI-46 RLT (Radioligandtherapy); # Concomitant / Subsequent therapy; WBCs white blood cells, Hb Hemoglobin, PLTs Platelets (thrombocytes), AST Aspartate transaminase, ALT Alanine transaminase, GGT Gamma-glutamyltransferase, ALP Alkaline phosphatase, sCr serum creatinine, T Bil total Bilirubin