Supplemental Table 1: Standard operation procedures (SOP) used for PSMA-TAT

	Initial SOP, active during therapy of the reported patients	Modified SOP , to be used for future patients
Definition of “PSMA-positive”	Visual analysis: average tumor-uptake > liver uptake	Visual analysis: average tumor-uptake > liver uptake AND uptake of at least one lesions > salivary glands
Intended / maximum number of cycles	3 / up to 5 (physicians choice)	3 / up to 5 (physicians choice)
Treatment interval (rationale)	every 2 months (restricted by availability of ^{225}Ac)	every 2 months (restricted by availability of ^{225}Ac)
Treatment activity (rationale)	Cycle 1-3: 100 kBq/kg body-weight (dosimetry estimate and empirical data; Ref. *17,19*)	Cycle 1: fixed activity of 8 MBq; Cycle 2-3: consider dose reduction of 2 MBq, if decline of PSA is >60% in the preceding cycle (clinical experience with these first n=40 patients)
Co-Medication prescribed	Day 0: 2000ml i.v. hydration with electrolyte solution Day 1: HCT 12.5mg Day 1-2: 2000ml oral hydration Day 1-3: anticoagulation Day 1-5: dexamethasone 2mg	
Co-Medication allowed	GnRH-analogues or GnRH-antagonists Bisphosphonate (administered >3 days remote to PSMA-RLT) Analgesics All drugs related to benign co-morbidity	
Co-Medication discontinued	Cabazitaxel, Docetaxel, other i.v. chemotherapy: >3 weeks in advance of PSMA-TAT oral chemotherapy, abiraterone, enzalutamide: until day 0	
Follow-up markers	PSA, ALP	PSA, ALP, LDH, NSE or Chr.-A
Safety lab	blood-cell-count, liver enzymes, creatinine/BUN, electrolytes	

PSA prostate-specific antigen, ALP alkaline phosphatase, LDH lactate-dehydrogenases, NSE neuron-specific enolases, Chr.-A Chromogranine-A, BUN blood urea nitrogen, GnRH gonadotropin releasing hormone