

Supplementary table 1: Search strategy PubMed

Exploratory searches PubMed (10-4-2020) used for inclusion (as described in methods).

Type of cancer Search string	Hits
Renal cell cancer (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((renal cell) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab])))	Hits: 105
Uterine cancer (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((uterine OR endometrial) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab]))	Hits: 7
Liver cancer (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((liver) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab]))	Hits: 175
Glioblastoma (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((glioblastoma) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab])) OR glioblastoma)	Hits: 23
Lung cancer (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((lung) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab]))	Hits: 114
Adrenocortical carcinoma (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND	Hits: 4

(((adrenocortical) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab])))	
Ovarian cancer (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((ovarian) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab])))	Hits: 13
Pheochromocytoma OR Paraganglioma (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (Pheochromocytoma OR Paraganglioma)	Hits: 1
Sarcoma (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND sarcoma	Hits: 15
Cholangiocarcinoma (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND ((((cholangio) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab]))) OR cholangiocarcinoma)	Hits: 2
Thyroid (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((thyroid) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab])))	Hits: 56
Breast cancer (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((breast) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab])))	Hits: 87
Salivary gland cancer (((PSMA[tiab] OR prostate specific membrane antigen[tiab] OR "FOLH1 protein, human" [Supplementary Concept]))) AND (((Salivary gland) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab])))	Hits: 93

OR malignanc*[tiab] OR neoplas*[tiab] OR tumor*[tiab] OR tumour*[tiab]))))	
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All cancer types with >20 hits on the exploratory searches were included in the review, which are highlighted in bold.

Final universal PubMed search strategy (23-10-2020)*

Search strategy PubMed	
Pubmed	
#1	((((((((((((PSMA[tiab]) OR prostate specific membrane antigen[tiab]) OR FOLH1[tiab]) OR FOLH[tiab]) OR folate hydrolase[tiab]) OR "FOLH1 protein, human" [Supplementary Concept])) OR Glutamaat carboxypeptidase II[tiab]) OR GCPII[tiab]) OR GCP2[tiab]) OR NAAG peptidase[tiab]) OR NAALADase I[tiab]) OR NAALDase1[tiab])
#2	((type of cancer) AND (carcinoma*[tiab] OR cancer*[tiab] OR malignanc*[tiab] OR neoplasm*[tiab] OR tumor*[tiab] OR tumour*[tiab]))
#3	#1 AND #2

*In addition to the articles identified through the elaborate search strategy, we included a recent article (published after de date of the final search on 23-10-2020). This article showed important PSMA imaging in hepatocellular carcinoma and reports on 2 patients treated with PSMA-radioligand therapy.

Study	mRNA expression	PSMA expression tumor cells IHC	PSMA expression vasculature IHC	PSMA PET imaging	J591 imaging	Proportion of patients possibly eligible for PSMA RLT	Comments
Salivary gland cancer							
Subtype: adenoid cystic carcinoma							
Klein Nulent, 2020 [1]	-	<i>Primary tumor</i> N=110 PSMA+: 94% (103/110) Median positive cells: 31% (IQR: 15-60%) <i>Metastases</i> N=10 PSMA+: 90% (9/10) Median positive cells: 23% (IQR: 10-55%)	-	-	-	-	
Van Boxtel, 2020 [2]	-	<i>Primary tumor</i> N=14 PSMA+: 79% (11/14) median positive cells: 10% (range: <1-90%) <i>Metastases</i> N=11 PSMA+: 73% (8/11) median positive cells: 5% (range: 5-80%)	<i>Primary tumor</i> N=14 PSMA+: 0% (0/14) <i>Metastases</i> N=9 PSMA+: 0% (0/9)	<i>Primary/local recurrence</i> N=3 PET uptake: 100% (3/3) <u>Mean SUVmax*</u> : range: 4.8-13.8 <i>Metastases</i> N=14 PET uptake: 100% (14/14) <u>Mean SUVmax*</u> : range: 3.9-14.9	-	93%; tumor/liver-ratio >1: 13/14 patients	PET Radiotracer: ⁶⁸ Ga-PSMA *mean SUVmax per site of metastases were calculated. Overall in ACC patients tumor SUVmax ranged from 1.1 to 30.2
Klein Nulent, 2017 [3]	-	<i>Primary tumor</i> N=9 PSMA+: 100% (9/9) median positive cells: 30% (range: 5-90%)	-	<i>Primary/local recurrence</i> N=4 PET uptake: 100% (4/4) Median SUVmax:	-	-	PET Radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
		<i>Metastases</i> N=3 PSMA+: 100% (3/3) median positive cells: 70% (range: 5-70%)		2.52 (IQR 2.41–5.95) <i>Metastases</i> N=9 PET uptake: 100% (9/9) Median SUVmax: 4.01 (IQR 2.66–8.71)			
Koning, 2017 [4]	-	<i>Primary tumor</i> N=1 PSMA+: yes positive cells: 5%	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: 23.25	-	-	PET Radiotracer: ⁶⁸ Ga-PSMA
De Keizer, 2017 [5]	-	<i>Primary tumor</i> N=1 PSMA+: yes positive cells: NR	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	
Lutje, 2016 [6]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET Radiotracer: ⁶⁸ Ga-PSMA
Has Simsek, 2019 [7]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET Radiotracer: ⁶⁸ Ga-PSMA
Subtype: salivary duct carcinoma							
Van Boxtel, 2020 [2]	-	<i>Primary tumor</i> N=9 PSMA+: 44% (4/9) median positive cells: 5% (range: <1%-50%) <i>Metastases</i> N=1 PSMA+: no	<i>Primary tumor</i> N=9 PSMA+: 89% (8/9) <i>Metastases</i> N=1 PSMA+: yes	<i>Local recurrence</i> N=3 PET uptake: 100% (3/3) <u>Mean SUVmax*</u> : range: 4.0-16.8 <i>Metastases</i> N=9	-	40%; tumor/liver-ratio >1 in 4/10 patients	PET Radiotracer: ⁶⁸ Ga-PSMA *mean SUVmax per site of metastases were calculated. Overall in SDC patients tumor

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				PET uptake: 100% (9/9) Mean SUVmax*: range: 1.8-14.3			SUVmax ranged from 0.3 to 25.9
Glioblastoma							
Chang, 1999 [8]	-	<i>Primary/local recurrence</i> N=1 PSMA+: no	<i>Primary/local recurrence</i> N=1 PSMA+: yes	-	-	-	
Salas Fragomeni, 2017 [9]	-	<i>Primary/local recurrence</i> N=2 PSMA+: 0% (0/2)	<i>Primary/local recurrence</i> N=2 PSMA+: 100% (2/2)	<i>Primary/local recurrence</i> N=2 PET uptake: 100% (2/2) SUVmax: NR	-	-	PET Radiotracer: [¹⁸ F]DCFPyL
Nomura, 2014 [10]	-	<i>Primary/local recurrence</i> N=5 PSMA+: 0% (0/5)	<i>Primary/local recurrence</i> N=5 PSMA+: 100% (5/5)	-	-	-	
Wernicke, 2011 [11]	-	-	<i>Primary/local recurrence</i> N=32 PSMA+: 100% (32/32)	-	-	-	
Schwenck, 2015 [12]	-	-	<i>Primary/local recurrence</i> N=1 PSMA+: yes	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: : NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Saffar, 2018 [13]	-	-	<i>Primary/local recurrence</i> N=27 PSMA+: 41% (11/27)	-	-	-	
Mahzouni, 2019 [14]	-	-	<i>Primary/local recurrence</i> N=60	-	-	-	

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
			PSMA+: 67% (40/60)				
Sasikumar, 2017 [15]	-	-	-	<i>Primary/local recurrence</i> N=5 PET uptake: 100% (5/5) SUVmax: range 5.8-21.7	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Kunikowska, 2018 [16]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: 23.7	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Sasikumar, 2018 [17]	-	-	-	<i>Primary/local recurrence</i> N=10 PET uptake: 100% (10/10) SUVmax: was only reported for two patients: 4.07 and 22.3	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Verma, 2019 [18]	-	-	-	<i>Primary/local recurrence</i> N=7 PET uptake: 100% (7/7) Mean SUVmax: 16.93 (range: 9.6-24.6)	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Gupta, 2020 [19]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
Kunikowska, 2020 [20]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: 10.3	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Kunikowska, 2020 [21]	-	-	-	<i>Primary/local recurrence</i> N=15 PET uptake: 100% (15/15) Median SUVmax: 6.5 (range: 2.1-14.3)	-	40%; tumor/liver ratio >1 in 6/15 patients 13%; tumor/liver ratio >1.5 in 2/15 patients	PET radiotracer: ⁶⁸ Ga-PSMA
Marafi, 2020 [22]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ¹⁸ F-PSMA
Pilati, 2020 [23]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Kumar, 2020 [24]	-	-	-	<i>Local recurrence</i> N=1 PET-uptake: yes SUVmax: NR	-	-	
Thyroid cancer							
Subtype: medullary thyroid carcinoma							
Ciappuccini, 2019 [25]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: 4.5	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Arora, 2018 [26]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes	-	-	PET radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				SUVmax: NR			
Arora, 2018 [27]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: 19.7	-	N=1, tumor/liver ratio >2	PET radiotracer: ⁶⁸ Ga-PSMA
Bychkov, 2017 [28]	-	<i>Primary tumor</i> N=10 PSMA+: 0% (0/10)	<i>Primary tumor</i> N=10 PSMA+: 40% (4/10)	-	-	-	
Heitkötter, 2018 [29]	-	-	<i>Primary tumor</i> N=12 PSMA+: 33% (4/12)	-	-	-	
Lodewijk, 2018 [30]	-	-	<i>Primary tumor</i> N=104 PSMA+: 92% (96/104)	-	-	-	
Subtype: anaplastic thyroid carcinoma							
Damle, 2018 [31]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: NR <i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Moore, 2017 [32]	-	<i>Primary tumor</i> N=5 PSMA+: 0% (0/5)	<i>Primary tumor</i> N=5 PSMA+: 80% (4/5)	-	-	-	
Bychkov, 2017 [28]	-	<i>Primary tumor</i> N=10 PSMA+: 0% (0/10)	<i>Primary tumor</i> N=10 PSMA+: 40% (4/10)	-	-	-	
Heitkötter, 2018 [29]	-	-	<i>Primary tumor</i> N=4 PSMA+: 100% (4/4)	-	-	-	
Lawhn-Heath, 2020 [33]	-	-	-	<i>Primary/local recurrence</i> N=1			PET radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				PET uptake: yes SUVmax: 6.0			One other ATC patient had both a local recurrence and metastases, SUVmax was not separately reported per disease sites, but median SUVmax was 3.3
Subtype: differentiated thyroid carcinoma (papillary + follicular + radioactive iodine refractory)							
de Vries, 2020 [34]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: 1.38 <i>Metastases</i> N=5 median SUVmax: depends on site of metastases. SUVmax range: 0.9-10.6	-	60% (3/5); based on positive ⁶⁸ Ga-PSMA PET.	PET radiotracer: ⁶⁸ Ga-PSMA
Lengana, 2019 [35]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: NR <i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA Instead of SUVmax: SUVratio's were reported. These ratio's were calculated as a lesion to quadriceps muscle ratio using SUVmean.
Singh, 2018 [36]	-	-	-	<i>Primary/local recurrence</i> N=1	-	-	PET radiotracer: ¹⁸ F-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				PET uptake: yes SUVmax: NR			
Lutje, 2017 [37]	-	-	-	<i>Primary/local recurrence</i> N=2 PET uptake: yes SUVmax: 4.3-13.7 <i>Metastases</i> N=5 SUVmax range: 3.3-39.7	-	0%; tumor/liver ratio >1 in 0/5 patients	PET radiotracer: ⁶⁸ Ga-PSMA Higher SUVmax in FTC (N=3) compared to PTC (n=1).
Sager, 2016 [38]	-	-	-	<i>Primary/local recurrence</i> N=2 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Verma, 2018 [39]	-	-	-	<i>Metastases</i> N=10 median SUVmax: 31.35 (range: 4.7-101.8)	-	Very high SUVmax are reported (up to 101.8)	PET radiotracer: ⁶⁸ Ga-PSMA
Sasikumar, 2018 [40]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Taywade, 2016 [41]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Verburg, 2015 [42]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Osman, 2017 [43]	-	-	-	<i>Primary</i> N=1 PET uptake: yes SUVmax: 1.9	-	-	PET radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
Moore, 2017 [32]	-	<p><i>Primary tumor</i> Total: N=37</p> <p>cPTC: N=11 PSMA+: 0% (0/11)</p> <p>FvPTC: N=9 PSMA+: 0% (0/9)</p> <p>FTC: N=11 PSMA+: 0% (0/11)</p> <p><i>Metastases</i> N=9 PSMA+: 0% (0/9)</p>	<p><i>Primary tumor</i> Total: N=37</p> <p>cPTC: N=11 PSMA+: 100% (11/11)</p> <p>FvPTC: N=9 PSMA+: 78% (7/9)</p> <p>FTC: N=11 PSMA+: 100% (11/11)</p> <p><i>Metastases</i> N=9 PSMA+: 100% (9/9)</p>	-	-	-	
Bychkov, 2017 [28]	-	<p><i>Primary tumor</i> Total: N = 172</p> <p>FTC: N=52 PSMA+: 0% (0/52)</p> <p>PTC: N=120 PSMA+: 0% (0/120)</p> <p>RAIR-DTC: N=24 PSMA+: 0% (0/24)</p>	<p><i>Primary tumor</i> Total: N = 172</p> <p>FTC: N=52 PSMA+: 46% (24/52)</p> <p>PTC: N=120 PSMA+: 51% (61/120)</p> <p>RAIR-DTC: N=24 PSMA+: 63% (15/24)</p>	-	-	-	
Heitkötter, 2018 [29]	-	-	<p><i>Primary tumor</i> Total: N=41 FTC: N=10 PSMA+: 40% (4/10)</p> <p>PTC: N=31</p>	-	-	-	

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
			PSMA+: 58% (18/31)				
Sollini, 2019 [44]	-	-	<i>Primary tumor</i> Total: N=53 FTC: N=4 PSMA+: 100% (4/4) PTC: N=49 PSMA+: 76% (37/49)	-	-	-	
Joshi, 2017, [45]	-	-	-	<i>Primary tumor</i> N=1 (PTC) PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Lawhn-Heath, 2020 [33]	-	-	-	<i>Metastases</i> N=5 PET uptake: yes median SUVmax: 9.0 (range: 1.0-18.3)			PET radiotracer: ⁶⁸ Ga-PSMA
Renal cell cancer							
Subtype: clear cell							
Chang, 1999 [8]	-	<i>Primary tumor</i> N=11 PSMA+: 0% (0/11)	<i>Primary tumor</i> N=11 PSMA+: 100% (11/11)	-	-	-	
Chang, 2001 [46]	-	-	<i>Metastases</i> N=20 PSMA+: 75% (15/20)	-	-	-	In this study two anti-PSMA antibodies were used. Results of staining for the 7E11 antibody are reported here.
Kinoshita, 2006 [47]	-	-	<i>Primary tumor</i> § N=9 PSMA+: 56% (5/9)	-	-	-	§Study did not mention if PSMA expression was observed in tumor

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
							cells or neovasculature.
Baccalla, 2007 [48]	-	-	<i>Primary tumor</i> N=21 PSMA+: 76% (16/21)	-	-	-	
Al-Hamadie, 2008 [49]	-	-	<i>Primary tumor</i> N=30 PSMA+: 97% (29/30)	-	-	-	
Spatz, 2018 [50]	-	-	<i>Primary tumor</i> N=228 PSMA+: 77% (175/228)	-	-	-	
Demirci, 2014 [51]	-	-	-	<i>Metastases</i> N=1 Patient had 3 metastases PET uptake: yes Median SUVmax: 34.1 (range 28.3-35)	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Rowe, 2015 [52]	-	-	-	<i>Metastases</i> N=5 PET uptake: 100% (5/5) Median SUVmax: NR (range 1.6-19.3)	-	-	PET radiotracer: ¹⁸ F-DCFPyL
Rowe, 2016 [53]	-	-	-	<i>Metastases</i> N=1 Patient had 2 metastases PET uptake: yes SUVmax = 2.7 and 3.2	-	-	PET radiotracer: ¹⁸ F-DCFPyL
Rhee, 2016 [54]	-	-	-	<i>Primary tumor</i> N=10†	-	-	PET radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				PET uptake: 100% (10/10) <u>Mean SUVmax:</u> 18.0 (3.7-36.5) <i>Metastases</i> N=5 PET uptake: unclear <u>Mean SUVmax:</u> 19.5 (range 1.5-48)			†Mean SUVmax was only reported all included patients (N=10), 80% has clear cell, 10%: papillary and 10%: unclassified. ‡5/10 patients had metastases
Meyer, 2019 [55]	-	-	-	<i>Primary tumor</i> N=3 PET uptake: 100% (3/3) Median SUVmax: 9.6 (range 7.3-15.8) <i>Metastases</i> N=14 PET uptake: 75% (11/14) Median SUVmax: 2.7 (range 0.9-38.5)	-	-	PET radiotracer: ¹⁸ F-DCFPyL Study data indicates that the PSMA uptake of metastases is more heterogenous than of the primary lesions.
Sawicki, 2017 [56]	-	-	-	<i>Primary tumor</i> N=3 PET uptake: 3/3 (100%) Median SUVmax: 11.6 (range 1.7-27.2) <i>Metastases</i>	-	-	PET radiotracer: ⁶⁸ Ga-PSMA For primary tumors the TBR of the SUVmax was 0.2 (range 0.02-0.7). For metastases the TBR of the SUVmax

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				N=2 PET uptake: 2/2 (100%) Mean SUVmax: 9.9 (range 3.4-25.6)			was 11.7 (range 4.4-28.1)
Milowsky, 2007 [57]	-	-	-	-	<i>Metastases</i> N=8 75% (6/8) showed at least one area of known metastatic disease targeted by ¹¹¹ In-J591	-	
Einspieler, 2016 [58]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Rhee, 2016 [59]	-	<i>Primary tumor</i> N=1 PSMA+: no	<i>Primary tumor</i> N=1 PSMA+: yes	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Sasikumar, 2016 [60]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Siva, 2017 [61]	-	-	-	<i>Recurrence/ metastases</i> N=7 PET uptake: 86% (6/7) Median SUVmax: 7.7 (range: 5.3-26.5)	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Joshi, 2017 [45]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes	-	-	PET radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				SUVmax: NR			
Zacho, 2017 [62]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Gao, 2020 [63]	-	-	-	<i>Primary tumor</i> N=36 PET uptake: unclear SUVmax♣	-	-	PET radiotracer: ⁶⁸ Ga-PSMA ♣: range of SUVmax not reported, of 2 patients SUVmax were reported: 6.2 and 39.4. Based on figure 2 SUVmax ranged from about 5-45.
Raveenthiran, 2019 [64]	-	-	-	<i>Primary tumor</i> N=8 PET-uptake: 88% (7/8) SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Mittlemeier, 2020, [65]	-	-	-	<i>Primary/local recurrence</i> N=1 PET-uptake: yes SUVmax: NR <i>Metastases</i> N=1 PET-uptake: yes SUVmax: NR	-	-	PET radiotracer: ¹⁸ F-PSMA
Marafi, 2020 [66]	-	-	-	<i>Primary tumor</i> N=1 PET-uptake: yes SUVmax: NR <i>Metastases</i> N=1	-	-	PET radiotracer: ¹⁸ F-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				PET-uptake: yes SUVmax: NR			
Chen, 2020 [67]	-	-	-	<i>Primary tumor</i> N=1 PET-uptake: yes SUVmax: 13.1 Metastases N=1 SUVmax: range: 5.4-18.0	-	-	PET radiotracer: ⁶⁸ Ga-PSMA The patient multiple metastases, of 6 metastases, SUV max were reported.
Subtype: papillary							
Kinoshita, 2006 [47]	-	-	<i>Primary tumor</i> N=2 PSMA+: 100% (2/2)	-	-	-	§Study did not mention if PSMA expression was observed in tumor cells or neovasculature.
Al-Hamadie, 2008 [49]	-	-	<i>Primary tumor</i> N=15 PSMA+: 73% (11/15)				
Baccalla, 2007 [48]	-	-	<i>Primary tumor</i> N=20 PSMA+: 0% (0/20)	-	-	-	
Spatz, 2018 [50]	-	-	<i>Primary tumor</i> N=22 PSMA+: 14% (3/22)	-	-	-	
Rhee, 2016 [54]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 3.6	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Sawicki, 2017 [56]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 5.1	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Milowsky, 2007 [57]	-	-	-	-	<i>Metastases</i> N=2	-	

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
					50% (1/2) showed at least one area of known metastatic disease targeted by ¹¹¹ In-J591		
Siva, 2017 [61]	-	-	-	<i>Recurrence</i> N=1 PET uptake: no	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Yin, 2018 [68]	-	-	-	<i>Metastases</i> N=3 PET uptake: 67% (2/3) SUVmax: range: 1.8-4.1	-	-	PET radiotracer: [18F]DCFPyL
Raveenthiran, 2019 [64]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: no	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Subtype: undefined							
Rhee, 2016 [54]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 18.3	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Yin, 2018 [68]	-	-	-	<i>Metastases</i> N=2 PET uptake: 50% (1/2) SUVmax: range: 0.5-6.2	-	-	PET radiotracer: [18F]DCFPyL
Raveenthiran, 2019 [64]	-	-	-	<i>Primary tumor</i> N=6 PET uptake: 67% (4/6) SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Mittlmeier, 2020 [69]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes	-	-	PET radiotracer: ¹⁸ F-PSMA-1007

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				SUVmax: NR			
Hepatocellular carcinoma							
Hirmas, 2021 [70]	-	-	-	<i>Primary tumor</i> N=39 PET uptake: 97% (38/39) Mean SUVmax: 16.2 (range: 5.9-55.4) <i>Metastases</i> N=11 PET uptake: 100% (11/11) Mean SUVmax: NR (range: 2.9-21.3)	-		PET radiotracer: ⁶⁸ Ga-PSMA
Jiao, 2019 [71]	-	<i>Primary tumor</i> N=103 PSMA+: 0% (0/103)	<i>Primary tumor</i> N=103 PSMA+: 74% (76/103)	-	-	-	
Kesler, 2018 [72]	-	<i>Primary tumor</i> N=5 PSMA+: 0% (0/5)	<i>Primary tumor</i> N=5 PSMA+: 60% (3/5)	<i>Primary tumor</i> N=37 PET uptake: 97% (36/37) median SUVmax: 11.7 (range: 3.7-41.2) <i>Regenerative nodules</i> N=4 PET uptake: 0% (0/4) median SUVmax: NR	-	Tumors were divided in CT-enhancing and non-enhancing areas. All SUVmax-TBR's of enhancing areas are ≥ 1.5 . Of the 10 non-enhancing areas, 4 have a SUVmax-TBR < 1.5 .	PET radiotracer: ⁶⁸ Ga-PSMA Added diagnostic value: identification of new extrahepatic metastases were found in 2 patients.

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
Kuyumcu, 2019 [73]	-	-	-	<i>Primary tumor</i> N=19 PET uptake: 84% (16/19) <u>Mean SUVmax:</u> 17.4 (range: 3.8-36.9) <i>Metastases</i> N=1 PET uptake: yes SUVmax: 4.3	-	Of all PSMA-PET-positive patients, 15/16 had a TBR ≥ 1.5 (range 1.5-9.7)	PET radiotracer: ^{68}Ga -PSMA
Tolkach, 2019 [74]	-	<i>Primary tumor</i> N=168 PSMA+: 41% (69/168) Canalicular patterns	<i>Primary tumor</i> N=168 PSMA+: 90% (151/168)	<i>Primary tumor</i> N=1 PET-uptake: yes SUVmax: NR	-	-	PET radiotracer: ^{68}Ga -PSMA Reports on mRNA expression (but is based on results of Cancer Genome Atlas)
Alipour, 2017 [75]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 9.9	-	-	PET radiotracer: ^{68}Ga -PSMA Subtype hepatocellular cholangiocarcinoma
Das, 2020 [76]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 8.66	-	-	PET radiotracer: ^{68}Ga -PSMA
Erhamamci, 2020 [77]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 20.3	-	-	PET radiotracer: ^{68}Ga -PSMA
Patel, 2017 [78]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 9.1-11.2	-	-	PET radiotracer: ^{68}Ga -PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				<i>Metastases</i> N=2 PET uptake: yes SUVmax: NR			
Perez, 2019 [79]	-	-	-	<i>Primary tumor</i> N=1 PET uptake: yes SUVmax: 29.4	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Taneja, 2017 [80]	-	-	-	<i>Primary tumor</i> N=1 PET-uptake: yes SUVmax: 15.7	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Kunikowska, 2020 [81]	-	<i>Primary/local recurrence</i> N=6 PSMA+: 0% (0/6)	<i>Primary/local recurrence</i> N=6 PSMA+: 83% (5/6)	<i>Primary/local recurrence</i> N=15 PET-uptake: 100% (15/15) <u>Mean SUVmax: 14.7 (range: 5.5-29.3)</u> <i>Metastases</i> N=2 <u>PET-uptake: 100% (2/2)</u> <u>Mean SUVmax: 6.1 (range: 2.2-12.0)</u>	-	100%; tumor/liver ratio >1.5 in 15/15 patients	PET radiotracer: ⁶⁸ Ga-PSMA
Lung cancer							
Subtype: non-small cell lung cancer (squamous cell carcinoma, adenocarcinoma, large cell carcinoma)							
Liu, 1997 [82]	-	-	<i>Primary tumor</i> N=1 PSMA+: yes	-	-	-	
Chang, 1999 [8]	-	<i>Primary tumor</i> N=5 PSMA+: 0% (0/5)	<i>Primary tumor</i> N=5 PSMA+: 100% (5/5)	-	-	-	

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
Milowsky, 2007 [57]	-	-	-	-	<i>Metastases</i> N=3 100% (3/3) showed at least one area of known metastatic disease targeted by ¹¹¹ In-J591	-	
Wang, 2015 [83]	-	<i>Primary tumor</i> SCC: N=30 PSMA+: 50% (15/30) Adeno: N=29 PSMA+: 66% (19/29) Large cell: N=28 PSMA+: 46% (13/28)	<i>Primary tumor</i> SCC: N=30 PSMA+: 93% (28/30) Adeno: N=29 PSMA+: 76% (22/29) Large cell: N=28 PSMA+: 86% (24/28)	-	-	-	Of all NSCLC (N=87): 46% (40/87) expressed PSMA in tumor cells & 85% (74/87) expressed PSMA in neovasculature.
Pyka, 2016 [84]	-	-	<i>Primary tumor</i> N=7 PSMA+: 100% (7/7)	<i>Primary tumor</i> N=7 PET uptake: 100% (7/7) <u>Mean SUVmax:</u> 5.6 (range: NR)	-	-	PET radiotracer: ⁶⁸ Ga-PSMA Biased population: selected based on PSMA avid lesions on PET scan for prostate cancer.
Shetty, 2016 [85]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: 4.4	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Osman, 2017 [43]	-	-	-	<i>Primary tumor</i> N=2	-	-	PET radiotracer: ⁶⁸ Ga-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				Median SUVmax: NR, range: 3.7-7.0			Biased population: selected based on PSMA avid lesions on PET scan for prostate cancer.
Schmidt, 2017 [86]	-	<i>Primary tumor</i> SCC: N=121 PSMA+: 12% (14/121) Adeno: N=112 PSMA+: 2% (2/112) Large cell: N=42 PSMA+: 2% (1/42)	<i>Primary/metastases</i> SCC: N=121 PSMA+: 57% (69/121) Adeno: N=112 PSMA+: 37% (41/112) Large cell: N=42 PSMA+: 60% (25/42)	-	-	-	
Chia, 2018 [87]	-	-	-	<i>Primary tumor</i> N=1 (adeno) PET uptake: yes SUVmax: 4.8	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Jochumsen, 2018 [88]	-	-	-	<i>Primary tumor</i> N=1 (adeno) PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA The SUVmax was not reported but report states: "intense uptake"
Usmani, 2020 [89]	-	-	-	<i>Primary tumor</i> N=1 (adeno) SUVmax: 5.6	-	-	
Subtype: small cell lung cancer							
Wang, 2015 [83]	-	<i>Primary tumor</i> N=30 PSMA+: 0% (0/30)	<i>Primary tumor</i> N=30 PSMA+: 70% (21/30)	-	-	-	
Breast cancer							
Subtype: ductal carcinoma							

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
Chang, 1999 [8]	-	<i>Primary tumor</i> N=5 PSMA+: 0% (0/5) median positive cells: NR	<i>Primary tumor</i> N=5 PSMA+: 100% (5/5)	-	-	-	
Kinoshita, 2006 [47]	-	-	<i>Primary tumor</i> § N=5 PSMA+: 12.5% (1/5)	-	-	-	§Study did not mention if PSMA expression was observed in tumor cells or neovasculature.
Kasoha, 2017 [90]	-	<i>Primary tumor</i> N=51 PSMA+: 51% (26/51)	<i>Primary tumor</i> N=51 PSMA+: 80% (41/51)	-	-	-	
Tolkach 2018 [91]	-	-	<i>Primary tumor:</i> N=251 PSMA+: 65% (162/251)	-	-	-	
Kumar, 2018 [92]	-	-	-	<i>Primary tumor:</i> N=1 PET uptake: yes SUVmax: 9.7 <i>Lymph node:</i> N=1 PET uptake: yes SUVmax: 6.5	-	-	PET radiotracer: ⁶⁸ Ga-PSMA In male, BRCA 2 mutation.
Polverari, 2019 [93]	-	-	-	<i>Primary tumor:</i> N=1 PET uptake: yes SUVmax: 3.2	-	-	PET radiotracer: ⁶⁸ Ga-PSMA In male, BRCA 2 mutation. Also diagnosed with

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
							prostate cancer, including pelvic nodal metastasis.
Subtype: lobular carcinoma							
Chang, 1999 [8]	-	<i>Primary tumor</i> N=1 PSMA+: 0% (0/1) median positive cells: NR	<i>Primary tumor</i> N=1 PSMA+: 0% (0/1)	-	-	-	
Tolkach, 2018 [91]	-	-	<i>Primary tumor:</i> N=64 PSMA+: 42% (27/64)	-	-	-	
Subtype: undefined							
Liu, 1997 [82]	-	-	<i>Primary tumor</i> N=1 PSMA+: yes (1/1)	-	-	-	
Wernicke, 2014 [94]	-	-	<i>Primary tumor</i> ¶ N=92 PSMA+: 74% (68/92) <i>Metastases</i> ¶ N=14 PSMA+: 100% (14/14)	-	-	-	¶ subtypes: 70% IDC, 20% DCIS, 10% ILC. Results were not reported per subtype, only for total cohort.
Kasoha, 2017 [90]	-	<i>Primary tumor</i> # N=17 PSMA+: 29% (5/17) <i>Metastases</i> ** N=12 PSMA+: 75% (9/12)	<i>Primary tumor</i> # N=17 PSMA+: 47% (8/17) <i>Metastases</i> ** N=9 PSMA+: 89% (8/9)	-	-	-	# subtypes: ILC: N=12, ILD/IDC: N=3, tubular carcinoma: N=1, mucinous carcinoma N=1.

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
							Results were not reported per subtype, only for total cohort. ** report does not specify the subtypes of patients with metastases.
Sathekge, 2017 [95]	-	-	-	<i>Primary/local recurrence</i> N=13 PET uptake: 54% (7/13) Mean SUVmax: 2.45 (SD: 2.55) <i>Metastases</i> N=14 PET uptake: 86% (12/14) Mean SUVmax: 6.86 (SD 5.68)	-	-	PET radiotracer: ⁶⁸ Ga-PSMA Cohort consisted of: IDC: N=13, ILC: N=2, neuro-endocrine: N=1, unclear: N=3 Overall 81 tumor lesions on routine examination, 84% detection rate on ⁶⁸ Ga-PSMA PET.
Sathekge, 2015 [96]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Malik, 2018 [97]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ⁶⁸ Ga-PSMA
Passah, 2018 [98]	-	-	-	<i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	Uptake in metastases was slightly more than liver.	PET radiotracer: ⁶⁸ Ga-PSMA
Marafi, 2020 [99]	-	-	-	<i>Metastases</i> N=1	-	-	PET radiotracer: ¹⁸ F-PSMA

Study	mRNA	PSMA IHC cells	PSMA IHC vessels	PSMA PET	J591 imaging	Relevant uptake for therapy	Comments
				PET uptake: yes SUVmax: NR			
Milowsky, 2007 [57]	-	-	-	-	<i>Metastases</i> N=3 67% (2/3) showed at least one area of known metastatic disease targeted by ¹¹¹ In-J591	-	
Marafi, 2020 [100]	-	-	-	<i>Primary/local recurrence</i> N=1 PET uptake: yes SUVmax: 5.0 <i>Metastases</i> N=1 PET uptake: yes SUVmax: NR	-	-	PET radiotracer: ¹⁸ F-PSMA

Abbreviations

IHC: immunohistochemistry, IQR: inter quartile range, NR: not reported, N: number of patients, SUV: Maximum standardized uptake value, PSMA: prostate specific membrane antigen, ⁶⁸Ga: Gallium-68, TBR: tumor-to-background ratio, SD: standard deviation, IQR: interquartile range.

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