

# How does <sup>68</sup>Ga-PSMA PET/CT impact the treatment management in patients with prostate cancer recurrence after surgery?



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## Introduction and objective

To evaluate the **clinical impact** of **68Ga-Prostate-specific membrane antigen (PSMA) Positron Emission Tomography/Computed tomography (PET/CT)** on the planned management in prostate cancer (PCa) patients with **biochemical recurrence (BCR) after surgery**

## Material and Methods

- We retrospectively enrolled **276 patients** submitted to **RP for PCa** and with confirmed **BCR during follow-up**.
- To assess the **site of recurrence** each patient was referred to **68Ga-PSMA PET/CT**.
- **110** and **90** men were re-staged with **11C-Choline PET/CT** and/or **Conventional Imaging** (including CT scan and/or MRI and/or BS) **prior to PSMA PET/CT**, respectively.
- For each patient a **clinical approach** was defined as follows: **PSA monitoring**, **salvage RT** delivered to prostatic bed and/or pelvic and/or retroperitoneal lymph nodes, **surgical lymph-nodes dissection**, **surgical metastasis resection**, **systemic therapies**.
- **Intended treatment before imaging** was determined in our Prostate Cancer Unit Multidisciplinary board.
- The re-assessment of treatment after **revision of each imaging technique** was recorded by the same board.
- The effective **clinical impact** of **68Ga-PSMA PET/CT**, **choline PET/CT** and **Conventional imaging** was rated as **major** (change in therapeutic approach), **minor** (same treatment, but modified therapeutic strategy) or **none**.

## Results

Table 1 Overall patients characteristics

Variable	Overall	PSMA PET/CT Positive	PSMA PET/CT Negative	P value
No. of patients (%)	276 (100.0)	145 (52.5)	131 (47.5)	-
Age (years)				0.4
Median	68	68	68	
IQR	62-73	62-73	65-73	
Pathologic Gleason Score, n (%)				0.37
7	20 (7.2)	13 (9.0)	7 (5.3)	
8	189 (68.2)	92 (63.8)	97 (72.8)	
9-10	87 (31.6)	40 (27.8)	47 (35.9)	
Pathologic stage, n (%)				0.009
pT2	9 (3.3)	7 (4.8)	2 (1.5)	
pT3	98 (35.5)	57 (39.3)	41 (31.3)	
pT3b-pT4	95 (34.8)	54 (37.2)	41 (31.3)	
pT4	74 (26.8)	37 (25.5)	37 (28.1)	
PSA, n (%)				0.6
Missing data	8 (2.9)	4 (2.8)	4 (3.1)	
No	87 (31.5)	41 (28.3)	46 (35.0)	
Yes	201 (72.8)	100 (69.0)	101 (77.1)	
nodal status, n (%)				0.5
No	144 (52.2)	87 (59.7)	57 (43.5)	
Yes	137 (49.8)	15 (10.3)	24 (18.3)	
Adjuvant radiotherapy, n (%)				0.04
No	209 (75.8)	114 (79.3)	95 (72.8)	
Yes	73 (26.4)	31 (21.4)	42 (32.1)	
Adjuvant ADT, n (%)				0.03
No	121 (43.7)	128 (88.3)	109 (82.6)	
Yes	155 (56.3)	17 (11.7)	29 (22.4)	
PSA at BCR (ng/ml)				<0.001
Median	0.72	0.52	1.1	
IQR	0.37-1.40	0.30-0.95	0.52-2.0	
PSA ranges at BCR, n (%)				<0.001
0-0.5	100 (36.2)	70 (48.3)	30 (22.9)	
0.5-1	71 (25.7)	41 (28.3)	30 (22.9)	
1-2	64 (23.2)	24 (16.5)	40 (30.8)	
>2	41 (14.9)	10 (6.9)	31 (23.7)	
Time to BCR (months)				0.6
Median	26	27	26	
IQR	12-50	14-51	12-50	
Conventional imaging, n (%)				0.03
No	122 (44.2)	73 (50.3)	49 (37.4)	
Choline PET CT	100 (36.2)	49 (33.1)	51 (38.7)	
CT scan	28 (10.1)	9 (6.2)	19 (14.5)	
MRI	35 (12.6)	19 (13.1)	16 (12.2)	
Bone Scan	37 (13.4)	18 (12.4)	19 (14.5)	

Figure. 73 yrs, 2008 RP (pT3bN0R0 Gs 4+3). Intermittent ADT from 2011 till July 2017. October 2017 → PSA 0.6 ng/ml → Cho PET negative for recurrent lesions. January 2018 → PSA 1.1 ng/ml → PSMA PET right internal iliac nodal recurrence. February 2018 → sLND (2/18 positive LNs) 8 months free from ADT with PSA <0.01ng/ml

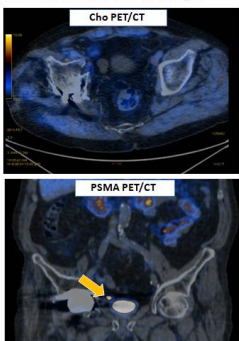


Table 2a Prostate cancer patients' management after imaging assessment: 68Ga-PSMA PET/CT (n=276 patients), 11C-Choline PET/CT (n=110 patients) and conventional imaging (n=90 patients).

	Clinical management before imaging	68Ga-PSMA PET/CT	Choline PET/CT	Conventional imaging (CT/MRI/BS)
No treatment, n (%)	31 (11.2)	99 (35.9)	30 (27.3)	24 (26.7)
Salvage RT, n (%)	105 (38.1)	72 (26.0)	29 (26.4)	32 (35.6)
-prostatic bed	0 (0)	23 (8.3)	8 (7.3)	21 (23.3)
-prostatic bed + pelvic nodes	102 (37)	19 (6.9)	16 (14.6)	10 (11.1)
-pelvic nodes	3 (1.1)	12 (4.3)	2 (1.8)	1 (0.01)
-extrapelvic nodes	0 (0)	15 (5.4)	1 (0.9)	0 (0)
-bones	0 (0)	3 (1.1)	2 (1.8)	0 (0)
-visceral	0 (0)	0 (0)	0 (0)	0 (0)
Salvage lymph node dissection, n (%)	0 (0)	9 (3.3)	2 (1.8)	0 (0)
Surgical metastasis resection, n (%)	0 (0)	1 (0.4)	0 (0)	0 (0)
Systemic therapies, n (%)	140 (50.7)	95 (34.4)	49 (44.5)	34 (37.8)

Table 2b Clinical impact of different imaging techniques (namely, 68Ga-PSMA PET/CT in 276 patients, 11C-Choline PET/CT in 110 patients and conventional imaging in 90 patients) on treatment changes.

	68Ga-PSMA PET/CT	11C-Choline PET/CT	Conventional imaging (CE-CT/MRI/BS)
Major clinical impact	177 (64.1)	40 (36.4)	31 (34.4)
1. From palliative to curative	49 (17.8)	11 (10)	6 (6.7)
2. From curative to palliative	20 (7.2)	2 (1.8)	3 (3.3)
3. From palliative to surveillance	22 (8)	6 (7.3)	10 (11.1)
4. From curative to surveillance	66 (23.9)	16 (14.5)	7 (7.8)
5. From surveillance to curative	14 (5.1)	3 (2.7)	5 (5.5)
6. From surveillance to palliative	6 (2.2)	0 (0)	0 (0)
Minor clinical impact	7 (2.5)	17 (15.5)	21 (23.3)
- more aggressive/extended treatment	4 (1.4)	17 (15.5)	6 (6.7)
- less aggressive/extended treatment	3 (1)	0 (0)	15 (16.7)
No treatment change	92 (33.3)	53 (48.2)	38 (42.2)

## Conclusions

**68Ga-PSMA PET/CT** revealed a **significant clinical impact** in restaging PCa patients, since it allows to radically change the intended treatment approach before imaging evaluation, in roughly **two out three individuals**.