Prognostic value of [18F]Fluorocholine PET parameters in metastatic castrate–resistant prostate cancer patients treated with docetaxel

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BACKGROUND & AIM

Prostate cancer (PC) is the first most common cancer in men worldwide and its incidence is increasing in countries at higher socioeconomic development (1). The availability of new treatments for metastatic castrate-resistant prostate cancer (mCRPC) patients increases the need for reliable biomarkers to help clinicians to choose the better sequence strategy (2). The aim of the present retrospective and observational work was to investigate the prognostic value of [^{18}F]Fluorocholine(FCH) Positron Emission Tomography/Computed tomography (PET/CT) parameters in mCRPC.

PATIENTS AND METHODS

Between March 2013 and August 2016, 29 patients with mCRPC were investigated. They all received three-weekly docetaxel after androgen deprivation therapy and they underwent FCH PET/CT before and after the therapy. Semi-quantitative indices such as maximum standardized uptake value (SUVmax), mean standardized uptake value (SUVmean) with partial volume effect (PVC-SUV) correction, metabolically active tumour volume (MATV) and total lesion activity (TLA) with partial volume effect (PVC-TLA) correction were measured both in pre- and post-treatment FCH PET/CT scans for each lesion. Whole body indices were calculated as sum of values measured for each lesion (SSUVmax, SPVC-SUV, SMATV, STLA). Progression free survival (PFS) and overall survival (OS) were considered as clinical endpoints. Univariate and multivariate hazard ratios for whole body FCH PET/CT indices were performed and $p < 0.05$ was considered as significant.

RESULTS

At a median follow up of 6 years, mean PFS was 13.5 months (range 2.3 – 37.6 months) and mean OS was 37.0 months (range 4.7 – 66 months). Cox regression analysis showed a statistically significant correlation between PFS, SMATV and STLA (**Table 2**). No correlations between OS and FCH PET/CT parameters were defined probably due to the small sample size.

Cox regression analysis						
	PFS			OS		
Parameters	HR	95% CI	P	HR	95% CI	P
SPVC-SUV	1.025	0.99 – 1.05	0.12	1.07	0.96 – 1.05	0.76
SSUVmax	1.022	0.99 – 1.05	0.118	1.03	0.97 – 1.03	0.85
SMATV	1.019	1.06 – 1.09	0.005	1.01	0.99 – 1.02	0.09
STLA	1.02	1.0 – 1.08	0.012	1.0	0.99 – 1.01	0.38

Table 2. Cox regression analysis for progression – free survival and overall survival according to PET parameters

	Median (range) or N°	%
Age	71 (42 – 82)	
ECOG		
0	18	62
1	9	31
2	2	7
Gleason score		
6 – 7	10	34
8 – 9	17	59
10	2	7
Type of metastatic sites		
Lung	2	
Liver	3	
Bone only	24	
Node only	23	
Bone and node	8	
Local	5	
No. of previous treatment for CRPC disease		
None	5	17
One	21	73
Two or more	3	10

Table 1. Demographic and clinical characteristics of patients at baseline

Figure 1

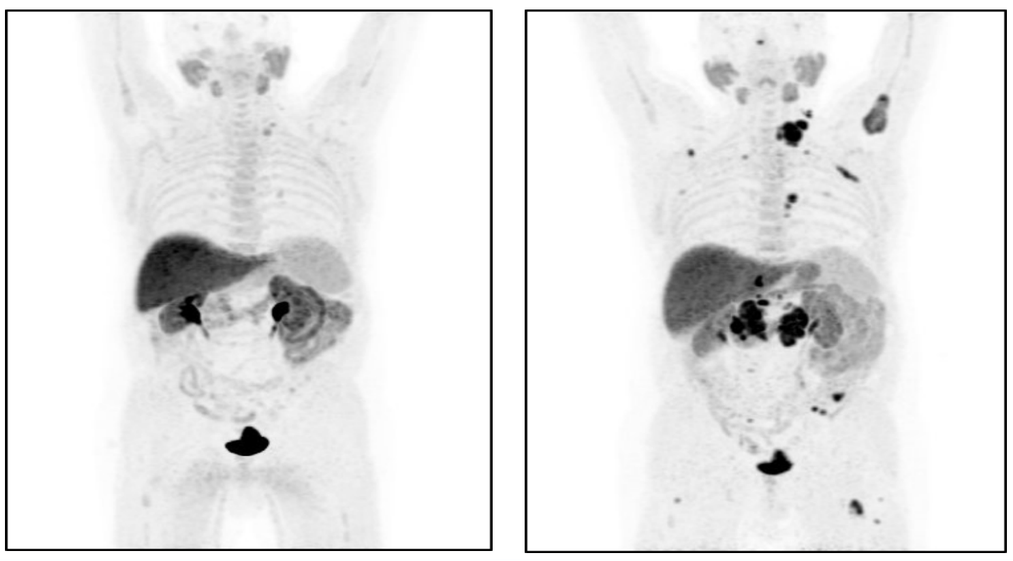
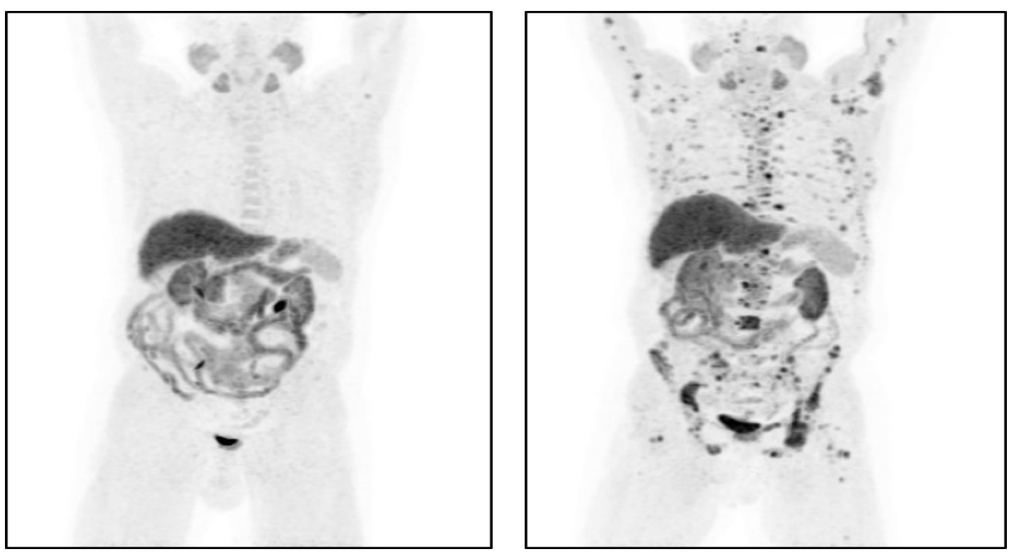


Figure 2



CONCLUSIONS

Semi-quantitative indices such as SMATV and STLA at baseline have a prognostic role in patients treated with docetaxel for mCRPC, suggesting a potential role of FCH PET/CT imaging in clinical decision-making.

Figure 1
Baseline FCH PET scan (left) and post treatment FCH PET scan (right) of a mCRPC patient with a complete metabolic response to Docetaxel.

Figure 2
Baseline FCH PET scan (left) and post treatment FCH PET scan (right) of a mCRPC patient with a progressive metabolic disease after Docetaxel treatment.

References:

1) Jemal A et al. Prostate Cancer Incidence and PSA Testing Patterns in Relation to USPSTF Screening. *JAMA. 2015 Nov 17;314(19):2054-61.*
2) Nuhn P et al. Update on Systemic Prostate Cancer Therapies: Management of Metastatic Castration-resistant Prostate Cancer in the Era of Precision Oncology. *Urol. 2019 Jan;75(1):88-99.*