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INTRODUCTION & OBJECTIVES: To identify prostate-specific antigen (PSA) kinetics parameters predictive of (18)F-fluorocholine PET (18FC PET/CT) features worsening in a cohort of patients with biochemical failure after prostate cancer treatment.

MATERIAL & METHODS: This longitudinal cohort study comprised 103 consecutive patients. All patients underwent two 18FC PET/CT: one at baseline (PET 1) and one after 6 months (PET 2). Total PSA (tPSA), PSA velocity (vPSA), PSA doubling time (dtPSA), absolute variation of PSA values between PET2 and PET1 (Δ PSA), percentage variation of PSA between the two PSA measurements were measured from each patients (PSA%). Progression of disease on 18FC PET/CT findings were compared with the PSA kinetics parameters. The major outcome measures were the disease progression at the PET.

RESULTS: 18FC PET/CT progression between PET1 and PET2 was reported in 64 patients (62.1%), while in 39 cases remained unvaried. We found that the following PSA kinetic parameters are correlated with worsened 18FC PET/CT findings: Δ PSA >5 ng/mL (OR=6.44;[95%CI 1.04-39.6]; p=0.04), vPSA >6 ng/mL/month (OR=5.2;[95%CI 0.9-29.8]; p=0.05) and PSA_{dt}

Univariate and Multivariate analysis results of factors affecting PET features worsening.

| Categories (variables) | Univariate analysis (p) | Multivariate analysis (p) |
|--|----------------------------|------------------------------|
| <i>Age</i> | 0.11 | 0.45 |
| <i>PSA at diagnosis</i> | 0.09 | 0.16 |
| <i>GS >=7 at biopsy</i> | 0.12 | 0.07 |
| <i>Clinical stage</i> | 0.54 | 0.23 |
| <i>Type of treatment</i> | 0.40 | 0.51 |
| <i>Pathological stage[§]</i> | 0.36 | 0.27 |
| <i>GS >=7 at biopsy[§]</i> | 0.22 | 0.09 |
| <i>PSA nadir</i> | 0.08 | 0.10 |
| <i>PSA%</i> | 0.25 | 0.12 |
| <i>ΔPSA >5 ng/ml</i> | 0.38 | 0.003 |
| <i>PSAdt <6 months</i> | 0.08 | 0.04 |
| <i>PSA velocity >6 ng/mL/month</i> | 0.45 | 0.02 |
| <i>Adjuvant Hormonal therapy</i> | 0.09 | 0.07 |
| <i>Charlson Index</i> | 0.09 | 0.09 |
| <i>Time to biochemical progression</i> | 0.33 | 0.41 |
| <i>tPSA at biochemical progression</i> | 0.42 | 0.45 |

CONCLUSIONS: PSA kinetics is strictly related to 18FC PET/CT findings. In patients with biochemical relapse, a ΔPSA >5 ng/mL, a PSAdt <6 ng/mL/month are highly predictive of 18FC PET/CT feature worsening, independently from the treatment received.