P013 Immunohistochemical PSMA expression and histology predictors in primary staging high-risk prostate cancer patients studied with PSMA PET/CT

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Introduction & Objectives: PSMA-PET/CT is used in clinical practice for staging and restaging prostate cancer (PCa). Still, there are cases in which there is no significative PSMA uptake despite high PSA levels, highlighting the need to identify histology and immunohistochemistry (IHC) features that might influence PSMA uptake and to improve the patients eligible for a PSMA-PET study. The aim of this study was to assess the correlation among histology, IHC and PSMA-PET parameters in a cohort of high-risk prostate cancer (PCa) patients at presentation.

Materials & Methods: This is a single-center, prospective observational cohort study in high-risk PCa patients enrolled in the PSMA-PROSTATA registry study. Patients candidate to surgery received PSMA-PET/CT for primary staging. Age, iPSA-level, Gleason score, ISUP grade, histologic pattern, presence of lymph-vascular invasion (LVI), PSMA-IHC visual quantification (VS) with four-tiered system (0=negative, 1+=weak, 2+=moderate, 3+=strong), PSMA-IHC growth pattern (infiltrative vs expansive) were collected both for biopsy and primary prostatic lesion (T) histology and compared with results from PSMA-PET/CT (positive/negative according to PROMISE criteria, SUVmax, PSMA tumour volume [PSMA-TV] and total lesion [PSMA-TL]).

Results: Overall, 14 patients were analysed, mean age was 66; median iPSA was 6.4 ng/dL (range 3.3-44.5). PSMA-IHC at biopsy showed strong PSMA expression (VS 3+) in 8 patients, and PSMA-ICH at radical prostatectomy (RP) specimen showed strong PSMA expression (VS3+) in 10 patients, of which 7 with fused cell type and 3 with cribriform type. After RP, we found a correlation between biopsy and T histology pattern and PSMA-IHC: 80% of patients with high PSMA expression (VS 3+) in RP specimens has high PSMA expression (VS3+) at bioptic cores ($p=0.2$ at McNaemar test). ISUP grade of 5, 4, 3 and 2 was found in 5, 5, 3 and 1 patients, respectively. PSMA-PET/CT detection rate for T was 100%. We found also correlation between high PSMA-TV/TL-PSMA and cribriform T histology pattern at Kruskal-Wallis analysis ($p<0.05$). PSMA infiltrative growth pattern vs expansive was also correlated with higher PCa SUVmax ($p=0.034$). Moreover, high PSMA-TV and TL-PSMA were shown to be correlated with LVI ($p<0.05$). Histology found N metastasis in 6 patients, with PSMA expression at IHC of 3+ and 1+ in 5 and 1 patients, respectively; however, only 1 patient has a positive PSMA-PET for N metastasis and another 1 turned false positive.

Conclusions: This preliminary study demonstrated a possible correlation among PSMA-IHC, histology pattern and PSMA-PET/CT for T evaluation. An intense PSMA-PET uptake could be able to predict tumour aggressiveness. We observed an intra-patient heterogeneity between IHC and PSMA expression on primary tumour and on N metastasis, and a correlation of IHC findings between prostate biopsy and pathologic specimens.