Improved prostate cancer detection and prediction of outcomes using 68Ga PSMA PET/CT: towards non-invasive precision medicine

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Introduction
68Ga Prostate-specific membrane antigen (PSMA) positron emission tomography (PET):
• Promising for prostate cancer (PCa) diagnosis and staging
• Primary tumour defined by PSMA PET = limited

Aim: to investigate PSMA PET/CT primary tumour characteristics, compared to multiparametric MRI (mpMRI), histopathology and survival outcomes.

Methods
• Retrospective cohort study of patients undergoing mpMRI, prostate biopsy, and PSMA-PET over 3-years.1,2
• Standard clinical and imaging parameters were collected.
• “Per patient” and “Per lesion” analyses for image-based detection according to RP histopathology were described using sensitivity, specificity and other measures of diagnostic accuracy.
• Intraprostatic PSMA intensity was correlated to adverse pathology outcomes and progression-free survival (PFS) using multivariate statistical analysis.

Results
• 144 patients; median age of 66.5 years and median PSA of 8.6 ng/ml.
• Compared to mpMRI, PSMA PET detected more:
  • Foci overall (77%, AUC 0.817)
  • Bilateral foci (42% vs 21%)
  • Multifocal disease (34% vs 19%)
• Additional detection of PSMA-PET > mpMRI for index (13.5% vs 4.3%) and total lesions (18.2% vs 5.4%)
• PSMA-PET identified significant tumours in 9/11 patients with normal (PIRADS-2) mpMRI.

Conclusions
• Well known that PFS best predicted by Gleason Grade (PSMA co-linear)
• Within Gleason Grade, PSMA INTENSITY predicted PFS
• Cox-regression adjusted survival analysis → 5.48-fold increase in hazard for high (SUVmax >8) compared with low (SUVmax <8) PSMA intensity.

References

Figure 1: Comparative imaging showing multifocal disease seen with 68Ga-PSMA PET/CT and not mpMRI

Figure 2: Cox regression-adjusted analysis of progression-free survival (PFS) after RP for patients within the Gleason score 3+4 subgroup according to low (SUVmax <8) or high (SUVmax ≥8) 68Ga-PSMA-11 expression