P071 Development and validation of a nomogram predicting presence of PSMA-negative but FDG-positive lesion in patients with castration-resistant prostate cancer: A multicentre, retrospective study

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Introduction & Objectives: Prostate-specific membrane antigen (PSMA)-negative but fluorodexyglucose (FDG)-positive (PSMA-/FDG+) lesion in (^{68}Ga-PSMA and ^{18}F-FDG) dual-tracer PET/CT was associated with poor response to PSMA-directed therapies. The aim of this study was to developed and validate a nomogram identifying PSMA-/FDG+ lesion in patients with castration-resistant prostate cancer (CPRC).

Materials & Methods: In this multicenter, retrospective study, 298 CRPC patients (development cohort, n = 257; external validation cohort, n = 41) undergoing dual-tracer PET/CT with a less than 5-day interval were included. Twenty-two development cohort patients had paired follow-up dual-tracer PET/CT scans. These paired scans were not included in initial nomogram construction but were used for internal validation. Variables with p <0.1 in univariate logistic regression analysis and of great importance in clinical use were included in stepwise logistic regression analysis. The Akaike information criterion (AIC) was used to compare the relative strength of different models. Model performance was measured by Harrell's concordance index (C-index) plots and decision curve analysis (DCA).

Results: Stepwise logistic regression analysis showed that the model (FUSCC nomogram) constructed by SUVmax of ^{68}Ga-PSMA PET/CT, prostate-specific antigen, number of lesions, bone metastases, prior docetaxel therapy, and alkaline phosphatase had the lowest AIC value. The bootstrap corrected C-index of FUSCC nomogram was 0.82 (95% confidence interval 0.75-0.89) and the calibration curves exhibited good agreement between the predicted and actual probability of PSMA-/FDG+ lesion positivity. In addition, the comparison of prediction ability between FUSCC model with Renji model (the only reported PSMA-/FDG+ disease predicting model now) was delivered. In development cohort, FUSCC model had a higher AUC value than Renji model (0.82 vs. 0.66). FUSCC model had a lower AIC value compared to Renji model in both development (199.59 vs. 233.81) and validation cohort (22.62 vs. 36.16). In DCA of both development and validation cohort, FUSCC nomogram provided better performance than either the "screen all" strategy or Renji model. Paired PET/CT scans analysis showed the change of PSMA-/FDG+ status significantly associated with increased absolute predicted risk (p = 0.04). When using a cut-off of ≥5.0%, in development cohort, 39% of ^{18}F-FDG PET/CT could be avoided while only missed 6% of PSMA-/FDG+ lesion. Using this threshold in external validation cohort, 34% of ^{18}F-FDG PET/CT could be avoided without missing PSMA-/FDG+ lesion.

Conclusions: This nomogram accurately identified PSMA-/FDG+ lesion in CRPC patients, which might assist in selecting candidates for ^{177}lutetium-PSMA-617 treatment and ^{68}Ga-PSMA PET/CT-directed radiotherapy.