FGFR2IIIb as a Candidate Urine Biomarker for Prostate Cancer Detection

Introduction and Objective: It is known that false-positive rate of PSA-based screening is very high. There is an urgent need for more accurate, noninvasive diagnostic testing for prostate cancer to avoid unnecessary prostate biopsies. We investigated several urine biomarkers for prostate cancer detection, compared with PCA3.
Materials and Methods: Urine samples were obtained from 60 patients, who needed prostate biopsy, with informed consent following a digital rectal exam (DRE) before either needle biopsy at Dokkyo Medical University Hospital. After isolation of RNA from each sample, quantitative RT-PCR was performed to detect five prostate cancer biomarkers (PCA3, GOLPH2, TMPRSS2-ERG, FGFR2IIIb, FGFR2IIIc) and the control transcripts PSA and GAPDH. The amount of PCR product was estimated by ΔC_t method. The ΔC_t value was normalized against urine PSA expression ($C_{t\,PSA}$ - $C_{t\ variable}$). The difference of the expression level of each biomarker between positive biopsy group and negative biopsy group was estimated by U-test. Moreover, sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of each biomarker were calculated with the median as cut-off level.
Results: Thirty-one patients of prostate cancer were confirmed by needle biopsy and 29 patients were benign. Significant difference of urine biomarker expression was detected only in FGFR2IIIb test ($p<0.05$). PCA3 test could not indicate the significance ($p=0.0759$). The sensitivity, specificity, PPV, and NPV of FGFR2IIIb test were 68%, 62%, 66% and 64%, respectively. On the other hand, PPV of PSA F/T (cut-off: 0.17), PSAD (cut-off: 0.17), DRE and imaging (mainly MRI) tests were 66%, 78%, 74% and 66%, respectively.
Conclusions: FGFR2IIIb test was superior to PCA3 test in this study. FGFR2IIIb may be a new urine biomarker for prostate cancer detection. However, routine examinations for prostate cancer detection indicated better PPV than FGFR2IIIb test. Further investigation will be needed.