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Complex analysis of PCA3 expression and amplification of TMPRSS2-ERG fusion transcripts in prostate cancer diagnosis

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Introduction & Objectives: Current direction in the diagnosis of prostate cancer (PCa) is the research and implementation into clinical practice the additional selection criteria for rebiopsy in patients with elevated serum prostatic specific antigen (PSA). The purpose of this study is to determine the effectiveness of complex analysis of PCA3 expression and amplification of TMPRSS2-ERG fusion transcripts in patients with a negative primary biopsy but with clinical features of PCa.

Materials & Methods: Urine samples from 85 patients were evaluated. Relative expression of PCA3 mRNA was measured by quantitative reverse transcription polymerase chain reaction (qRT-PCR) with deltaCt analysis. KLK3 was used as a reference gene. TMPRSS2-ERG amplification was evaluated by PCR following 2% gel electrophoresis. All patients underwent systematic prostate biopsy, taking into account suspicious target areas according to transrectal ultrasound and multiparametric magnetic resonance imaging.

Results: According to the morphology, PCa was diagnosed in 51 patients, prostatic intraepithelial neoplasia / benign prostatic hyperplasia in 34 patients. For separation of these patient groups deltaCt threshold of PCA3, based on the ROC analysis, was calculated. The value is ≤6.65 with diagnostic sensitivity and specificity 64.7% and 73.5% respectively ($p = 0.0001$; AUC 0.721). The sensitivity and specificity of TMPRSS2-ERG amplification was 45.1% and 82.4% respectively ($p = 0.0045$; AUC 0.637). Complex application of markers based on the results of binary logistic regression and ROC analysis allowed to increase the diagnostic sensitivity of the method to 84.3% with a specificity of 61.7% ($p < 0.0001$; AUC 0.768). Currently validation of the results is carried out.

Conclusions: Preliminary results evidence the possibility of the complex application of PCA3 expression and amplification of TMPRSS2-ERG fusion transcripts in urine as an additional criterion for examining patients suspected with PCa.