

PCA3 molecular urine test: Development of an easy and cheap assay of a potential use in the diagnosis of prostate cancer.

Khalid Al-Rumaihi, Jingxuan Shan, Sami Al-Said, Dhanya Kizhakayil, Idil i Aigha, Shoba p Dsouza, Lotfi Chouchane

Hamad Medical Corporation, Doha, QATAR; Weill Cornell Medical College in Qatar, Doha, QATAR

krumaihi@yahoo.com

Background:

The use of the serum prostate-specific antigen (PSA) test for prostate cancer screening has resulted in a diagnostic dilemma: PSA is not prostate cancer specific and could be found in the normal prostate at equal or higher levels than is found in prostate cancer. Prostate cancer gene 3 (PCA3) encodes a prostate-specific mRNA with a median 66-fold up-regulation compared to adjacent benign tissue. In contrast, PSA gene expression is similar in cancerous and benign cells; PSA mRNA levels may therefore be used to normalize for the amount of prostate-specific ribonucleic acid (RNA) in molecular test samples. This report describes the characterization of a prototype quantitative PCA3-based test for whole urine.

Methods:

First-catch urine specimens were collected after digital rectal examination. The total RNA was isolated with Trizol, amplified, and quantified by use of a real-time PCR method. PSA mRNA concentrations were used to normalize PCA3 signals and confirm the yield of prostate-specific RNA. PCA3 score is calculated by one thousand times of PCA3/PSA mRNA ratio. ROC curve analysis is applied to determine the cutoff value of PCA3 score according to prostate biopsy results.

Results:

We have collected urine samples of 163 patients from uro-oncology clinic at Hamad Hospital. Due to the mixture of the blood cells and prostate cells in the urine, we failed to obtain RNA with proper quality for 29 samples. The specimen informative rate (fraction of specimens yielding proper RNA for analysis) was 82.2%. From ROC curve with the known diagnostic data, the cut off of PCA3 score is 1232 with a sensitivity of 70% and specificity of 68%.

Conclusion:

The established PCA3 assay could increase specificity to the current prostate cancer diagnosis. Comparing to the commercial kit, it provides equivalently useful information and it is much cheaper and faster. The challenge is to avoid the interference from the blood cells in the urine.