

PROSTATE-SPECIFIC ANTIGEN (PSA) AN INDICATION OF POTENTIAL BIOMARKERS: A RETROSPECTIVE STUDY WITH REVIEW OF LITERATURE

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Abstract

Background: The Prostate-specific antigen (PSA) is a serine protease (SP) and produced through the epithelial prostatic cells (EPCs). The major function is to liquefy seminal coagulum (LSC). The PSA is an extreme biomarker for the diagnosis and screening tool for the prostate cancer (PC) as the first cancer biomarker approved by the FDA.

Material and methods: The quantity and serum isoforms of male PSA has been measured and distinguishing between suspicious, proven carcinoma, and benign inflammatory disease (BID) of the prostate. PSA was produced through the prostate, and this protein was expressed exclusively in Human subject.

Results: A total of (98%/ 150) we observed that PSA protein expressed through the multiple non-prostatic tissues (MNPTs) in human subject. PSA expression, protein function is more likely related to breast (95%), colon cancer (90% and prostate cancer 98%) respectively.

Conclusion: The PSA capable and advanced in molecular level study, with relevant clinical implications among human subject strictly count as a possible biomarker for early detection, diagnosis and prognosis and future research in different types of cancers as well.

Keywords: Prostate-specific antigen (PSA), epithelial prostatic cells (EPCs), breast, prostate

Introduction

Prostate-specific antigen (PSA), serine protease (SP) produced through an epithelial prostatic cells (EPCs). PSA is a biomarker for the diagnosis and screening of prostate cancer (PC) biomarker list approved by the FDA. PSA

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molecular level applied now for clinical implications. PSA expression of this protein in non-prostatic tissues, and its relationship with cancer, especially in women as target¹. The prostate-specific membrane antigen (PSMA) is a transmembrane protein (TMP) elevated with expression in prostate cancer cells. Breast cancer also shows PSMA expression. The PSMA-based therapy (PBT) good future option after exhausting standard-of-care treatments (ESOCs)². Testosterone Therapy (TT) in Men With Androgen Deficiency Syndromes guideline (ADSG) has been published in 2010. Researchers had suggested that T concentrations in the mid-normal range (MNR) during treatment with consideration of patient preference, pharmacokinetics, formulation-specific adverse effects (FSAEs). Additionally, monitor men receiving T therapy (TT) practiced as standardized plan that included with evaluating symptoms, adverse effects, and compliance; measuring serum T and hematocrit concentrations; and evaluating prostate cancer risk during the first year after initiating T therapy (TT)³. Novel approaches for classification, including molecular features, are needed to direct molecular therapy (DMT) for men and women with low-grade prostate cancer (PCa) (LGPCa) need men on active surveillance. 8q24, 10q11 and 19q13, were associated with PCa progression had implicated by the 21 of these single nucleotide polymorphisms (SNPs). The expression of androgen receptor pathway (ARP) and several other oncogenes. 8q24, encompassing MYC gene, higher level density of SNPs conferring in low-grade PCa, copy number gain of MYC gene. GWAS data within the gene expression and structural rearrangements, risk alleles, identification had identified that could provide a new develop in prognostication tool guide therapy (PTGT) for men with early prostate cancer⁴.

Material & Methods

We retrospectively collect the blood samples and quantify the serum isoforms of male & female PSA majored and distinguishing between suspicious, proven carcinoma, and benign inflammatory diseases (BIDs) of the prostate, breast and colon. PSA was produced through the prostate, Breast and colon, and this protein was expressed exclusively in Human subject were selected to performed the diagnostic tests/images through radiological findings. Finally we used our simple descriptive statistics to calculate percentage and mean through SPSS software version 14.

Results

A total of (98%/ 150) we observed that PSA protein expressed through the multiple non-prostatic tissues (MNPTs) in human subject. PSA expression, protein function is more likely related to breast (95%), colon cancer (90% and prostate cancer 98%) respectively.

Table 1: PSA findings with accuracy with the PSA EXP, Protein function, Breast cancer, prostate cancer and colon cancer.

Sl.No:	Samples	Male (n=102)	Female (n=48)	Sensitivity	Specificity
1.	PSA EXP	68%	32%	90%	85%
2.	Protein function	60%	40%	85%	80%
3.	Breast cancer	10%	90%	95%	90%
4.	prostate cancer	76%	24%	98%	95%
5.	colon cancer	22%	78%	90%	85%

NB: (Sensitivity, Specificity, PSA expression and other parameters taken as %).

Discussion

The cellular proliferation marker (CPM-Ki67) provides prognostic information and predicts response to radiation therapy fractionation (RTF) in patients with localized prostate tumors (PTs). Patients participating with randomized trial (RCT) of radiation therapy fractionation (RTF) schedules (74 Gy/37 fractions vs 60 Gy/20 fractions vs 57 Gy/19 fractions). Ki67 test did not predict BCR according to fractionation schedule in CHHiP, was a strong independent prognostic factor (IPF) for BCR⁵. Earlier diagnosis of prostate cancer (PCa) is particularly important for reducing its higher mortality rate (HMR). Development of molecular magnetic resonance imaging (MRI), diagnosis via non-invasive imaging has become possible now. Gadopentetic acid (GA)-doped silica (Gd@SiO₂) synthesized by a reverse microemulsion method (R-MEM), and amino and carboxyl groups were successively introduced onto the surface of this Gd@SiO₂. Again, monoclonal antibody (YPSMA-1) to prostate-specific membrane antigen (PSMA) was conjugated with carboxyl-modified Gd@SiO₂ (Gd@SiO₂-COOH) nanoparticles (NPs) by the carbodiimide method is another process. The Gd@SiO₂-Ab NPs were thus obtained as specific MR contrast agents for PCa-targeted imaging is widely accepted. Transmission electron microscopy (TEM) observed that Gd@SiO₂-Ab NPs exhibited dispersed spherical morphology (DSM) relatively uniform size distribution

(USD). It showed higher stability and higher longitudinal relaxation rate (r_1). Positively, Cell-targeting experiments (CTEs) in vitro demonstrated that high potential of the synthesized NPs to target PSMA receptor-positive PCa cells through in vitro cytotoxicity assays showed that good biological safety (GBS). Gd@SiO₂-Ab NPs had a great potential effect on MR contrast agents for PSMA receptor-positive PCa cells⁶.

Prostate-specific membrane antigen (PSMA) is a type II transmembrane glycoprotein that is highly overexpressed on prostate cancer epithelial cells (PCECs). It is a growing body of literature examining the role of smaller molecule and antibody radiotracers targeted (ARTT) against this protein for prostate cancer detection and therapy. PSMA is also expressed, to varying degrees, in the neovasculature of a wide variety of non-prostate cancers (NPCs). The aetiopathology literature is replete with promising immunohistochemistry (IHC) findings. A number of groups have begun to correlate pathology-level results with in vivo imaging and therapy in non-prostate cancers (NPCs) using the same PSMA-targeted agents that have been so successful in prostate and breast cancer (PABC)⁷.

Abiraterone acetate (AA), a CYP17 inhibitor, had crucial role in the treatment of castration-resistant prostate cancer (CRPC). Neutrophil-to-lymphocyte ratio (NLR) has also been investigated for a CRPC treatments in a few reports, been identified to be a prognostic factor for AA treatment in Japanese patients were assessed by the association of the baseline NLR with the overall survival (OS) in CRPC patients treated by AA. The 95% confidence interval (CI): 6.325-10.475 months] was correlated with a risk of mortality compared with a low NLR (NLR <3.76; median OS not reached). MANOVA (multivariate analysis) has been demonstrated that the NLR was an independent predictor for the OS (hazard ratio: 2.682; 95% CI: 1.143-6.293; P=0.023). NLR may be a useful novel biomarker for predicting the prognosis of CRPC patients treated with AA⁸. The male breast cancer is very lesser common as compared with the female breast cancer (FBC). The digital rectal examination (DRE) test revealed that hard and nodular prostate, and serum prostate-specific antigen level (SPSAL) was 23.4 ng/mL. The Ga-labeled prostate-specific membrane antigen PET/CT revealed prostate-specific membrane antigen-expressing lesions in the prostate, axillary tail of the right breast, and axillary lymph nodes. Histopathology report from prostate revealed prostate carcinoma, with fine-needle aspiration (FNA) from the breast revealed that invasive ductal carcinoma of the breast⁹. The present study undertaken to investigate the expression of prostate-specific membrane antigen (PSMA) in normal breast tissues, in cancerous breast tissues and in distant metastases from patients with the breast cancer (BC). Immunohistochemical (IHC) analysis was performed to determine PSMA expression and angiogenic activity using

anti-PSMA mAb and anti-CD31 mAb respectively. Immunofluorescence staining applied to confirm the exact co-localization of PSMA and CD31. We observed that different patterns of PSMA expression between normal and cancerous tissues (NACTs). Normal breast tissues showed PSMA expression only in normal glandular cells (NGCs).

The primary breast tumors (PBTs) had distant metastases showed PSMA expression in tumor cells and in tumor-associated neovasculature. PSMA score group status in primary breast tumors (PBTs) was significantly associated with histologic type and tumor grade ($p = 0.026$ and $p = 0.004$ respectively). Distant metastases showed higher PSMA expression in tumor-associated neovasculature (TANV), comparing with primary tumors. The brain tumor-associated neovasculature (BTANV) had significantly higher expression of PSMA comparing with the bone tumor-associated neovasculature (BTANV).

Binding of PSMA mAb to the neovasculature endothelium was confirmed through the double Immunofluorescence staining⁶⁸. Ga-PSAM imaging of a patient with metastatic breast cancer (MBC) had strong tracer uptake in all known skeletal metastases. The second one that has assessed PSMA expression in a larger number of breast cancer patients (BCPs). Our findings showed that PSMA expressed in tumor-associated neovasculature (TANV) of breast tumors and its distant metastases. Hence, enhancing the evidence on the potential usefulness of PSMA as a therapeutic vascular target is a clear picture and we believe that best biomarkers for this diseases¹⁰.

Limitations

Need more work to work out in our Indian Set-up.

Conclusion

Currently, the PSA capable and advanced in molecular level study (MLS) relevant for the clinical implications among human subject strictly count as a possible biomarker for early detection, diagnosis and prognosis for the prostate and breast cancer. Future research is needed in different types of cancers as well.

Acknowledgement: We thanking to our patients and their relatives.

Conflict of interest: Nil

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