Design and validation of a novel PSA-specific peptide derived from an anti-PSA monoclonal antibody

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Prostate cancer is the third most prevalent cancer in men, accounting for around 10% of the deaths from cancer. To ensure a high rate of survival, early detection of prostate cancer is certainly important. Prostate specific antigen (PSA) is the most significant biomarker to clinically diagnose prostate cancer. In this study, a novel short peptide derived from the complementarity-determining regions (CDRs) of an anti-PSA monoclonal antibody has been designed for recognition of PSA. CDRs are the parts of the variable chains of antibodies responsible for binding to antigens. The major PSA-binding site in the antibody was identified in the heavy chain CDR1 based upon the binding energy determined by molecular docking studies. Binding affinity and specificity of the designed peptide was experimentally validated by analyzing the intrinsic tryptophan fluorescence intensity by using Fluorescence spectroscopy. Conjugation of this novel peptide with suitable nanomaterial shall be conducted to develop a biosensor for early diagnosis of prostate cancer in future.