

## Colorimetric Measurement of Dipeptidyl Peptidase IV (DPP IV) Activity via Peptide Capped Gold Nanoparticles

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**Abstract :** DPP-IV is an enzyme whose expression is affected in a variety of diseases, therefore, has been identified as possible diagnostic or prognostic marker for various tumours, immunological, inflammatory, neuroendocrine, and viral diseases. Recently, DPP-IV enzyme has been identified as a novel target for type II diabetes treatment where the enzyme is involved. There is, therefore, a need to develop sensitive and specific methods that can be easily deployed for the screening of the enzyme either as a tool for drug screening or disease marker in biological samples. A variety of assays have been introduced for the determination of DPP-IV enzyme activity using chromogenic and fluorogenic substrates, nevertheless these assays either lack the required sensitivity especially in inhibited enzyme samples or displays low water solubility implying difficulty for use in vivo samples in addition to labour and time-consuming sample preparation. In this study, novel strategies based on exploiting the high extinction coefficient of gold nanoparticles (GNPs) are investigated in order to develop fast, specific and reliable enzymatic assay by investigating synthetic peptide sequences containing a DPP IV cleavage site and coupling them to GNPs. The DPP IV could be detected by colorimetric response of peptide capped GNPs (P-GNPs) that could be monitored by a UV-visible spectrophotometer or even naked eyes, and the detection limit could reach 0.01 unit/ml. The P-GNPs, when subjected to DPP IV, showed excellent selectivity compared to other proteins (thrombin and human serum albumin), which led to prominent colour change. This provided a simple and effective colorimetric sensor for on-site and real-time detection of DPP IV.

**Keywords :** gold nanoparticles, synthetic peptides, colorimetric detection, DPP-IV enzyme

**Conference Title :** ICNB 2015 : International Conference on Nanotechnology and Biotechnology

**Conference Location :** Miami, United States

**Conference Dates :** March 09-10, 2015