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A facile, colorimetric assay for DPP IV activity and inhibition based on an enzyme responsive nanoparticle system

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DPP IV is a transmembrane serine protease enzyme whose expression is up-regulated in a variety of diseases. Therefore, it has been identified as a potential diagnostic or prognostic marker for various tumors, immunological, inflammatory, neuroendocrine and viral diseases. Recently, DPP-IV enzyme has been recognized as a novel target for type II diabetes treatment where the enzyme is involved in the degradation of incretins. 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 they are not suitable for *in vivo* analysis because of their low water solubility combined with time consuming sample preparation. In this study, novel strategies based on exploiting the high extinction coefficient of GNPs are investigated in order to develop fast, specific and reliable enzymatic assay methods. The presence of 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 the naked eyes. Very low enzyme activity can be measured using this approach. The P-GNPs, when subjected to DPP IV, showed excellent selectivity compared to different physiological serum proteins (lysozyme, thrombin, trypsin and human serum albumin). Furthermore, our new design could also be applied to the assay of DPP IV inhibition since the DPP IV inhibitors can suppress its hydrolytic action, and thus, this new methodology can be easily adapted to a high throughput screening of DPP IV inhibitors.

Biography

Hasan Aldewachi did his Undergraduate degree in the University of Mosul, Iraq. He then went to England for a Master's degree in Pharmaceutical Analysis at the University of Sheffield Hallam. He published his Master's dissertation thesis in the *International Journal of Pharmaceutical Sciences Review and Research*. He is now pursuing a PhD at the University of the Sheffield Hallam under Dr. Philip Gardiner's supervision. His PhD project involves developing rapid and novel enzyme detection biosensors towards point of-care.

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