Abstract of Doctoral Dissertation Tan Xian Wen
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Title

Rapid and specific detection of oxidized LDL/β2GPI complexes via facile lateral flow immunoassay

Abstract

β2-Glycoprotein I (β2GPI) forms indissociable complex with oxidized LDL (oxLDL) into proatherogenic oxLDL/β2GPI complex through a specific ligand known as 7-ketocholesteryl-9-carboxynonanoate (oxLig-1). Recent discoveries have demonstrated the atherogenicity of these complexes in patients of both systemic and non-systemic autoimmune diseases. Hence, serological level of oxLDL/β2GPI complexes may represent one crucial clinical parameter for disease prognosis of atherosclerosis-related diseases. Herein, we established a simple, specific and rapid gold nanoparticle (GNP) based lateral flow immunoassay (LFIA) to quantify oxLDL/β2GPI complexes from test samples. Specificities of hybridoma cell-derived monoclonal antibodies against antigen, optimal conditions for conjugation of antibody with GNP, and sensitivity of oxLDL/β2GPI LFIA in comparison to an ELISA-based detection method were assessed accordingly. The established oxLDL/β2GPI LFIA was capable of detecting oxLDL/β2GPI specifically without interference from autoantibodies and solitary components of oxLDL/β2GPI present in test samples. A significant correlation ($R2 > 0.8$) was also obtained with the oxLDL/β2GPI LFIA when compared to the ELISA-based detection. On the whole, the oxLDL/β2GPI LFIA remains advantageous over the oxLDL/β2GPI ELISA. The unnecessary washing step, short developmental and analytical time support facile and rapid detection of oxLDL/β2GPI as opposed to the laborious ELISA system.

Keywords: Oxidized LDL (oxLDL), β2-Glycoprotein I (β2GPI), OxLDL-β2GPI, Lateral flow immunoassay (LFIA), Enzyme-linked immunosorbent assay (ELISA), Point-of-care