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Immunosensors for quantifying cyclooxygenase 2 pain biomarkers.

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Abstract

BACKGROUND: Cyclooxygenase 2 (COX-2) is a key enzyme in pain biomarkers, inflammation and cancer cell proliferation. Thus biosensors that can quantify pain mediators based on biochemical mechanism are imperative.

METHODS: Biomolecular recognition and affinity of antigenic COX-2 with the antibody were investigated using surface plasmon resonance (SPR) and ultra-sensitive portable capillary (UPAC) fluorescence sensors. Polyclonal goat anti-COX-2 (human) antibodies were covalently immobilized on gold SPR surface and direct recognition for the COX-2 antigen assessed. The UPAC sensor utilized an indirect sandwich design involving covalently attached goat anti-COX-2 as the capture antibody and rabbit anti-COX-2 (human) antibody as the secondary antibody.

RESULTS: UPAC fluorescence signals were directly proportional to COX-2 at a linear range of 7.46×10^{-4}-7.46×10^{1} ng/ml with detection limit of 1.02×10^{-4} ng/ml. With SPR a linear range was 3.64×10^{-4}-3.64×10^{2} ng/ml was recorded and a detection limit of 1.35×10^{-4} ng/ml. Validation was achieved in simulated blood samples with percent recoveries of 81.39% and 87.23% for SPR and UPAC respectively.

CONCLUSION: The developed sensors have the potential to provide objective characterization of pain biomarkers for clinical diagnoses.

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