Title : Development of lateral flow assay for liver cancer biomarker

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ABSTRACT

Hepatocellular carcinoma (HCC) is the most common form of liver cancer and has the highest mortality rate in Thailand. The development of a rapid and simple test kit for measuring liver cancer biomarkers significantly enhances early detection and treatment of the disease. Lateral flow assay (LFA) is a widely used diagnostic tool that offers quick results, ease of use, low cost, and on-site applicability. Antibodies are commonly used as a biorecognition element, and gold nanoparticles (AuNPs) are materials commonly used as labels. Fucosylated alpha-fetoprotein (AFP-L3) is a specific and sensitive biomarker for HCC. Its levels increase significantly in patients with HCC but not in those with other liver diseases. In this work, we developed an LFA using lectin, which specifically binds to AFP-L3, as a biodetector immobilized on the membrane at the test line (T). Goat anti-mouse immunoglobulin (IgG) was immobilized as the control line (C). Various parameters affecting strip performance, including types of lectins, label materials and running buffers, were studied. The signal measurement of the developed test strip was performed by measuring the RGB color intensity on the T and C lines using an in-house test strip reader. The ratio of the T signal to the C signal on the same test strip was used to compensate for background noise and intrinsic variation of the strip. Under the optimal conditions, the proposed test strip is a simple and fast assay for detecting AFP-L3 and could be further developed for field application.