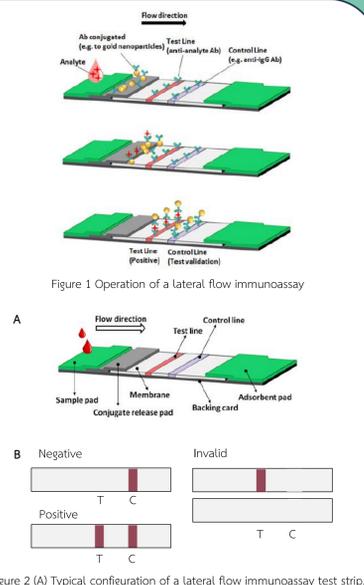


ABSTRACT

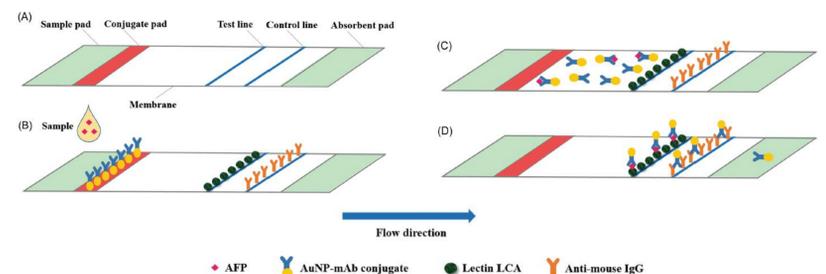
Hepatocellular carcinoma (HCC) is the most common form of liver cancer and has the highest mortality rate in Thailand. The development of a rapid and simple test kit for measuring liver cancer biomarkers significantly enhances early detection and treatment of the disease. Lateral flow assay (LFA) is 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.

INTRODUCTION

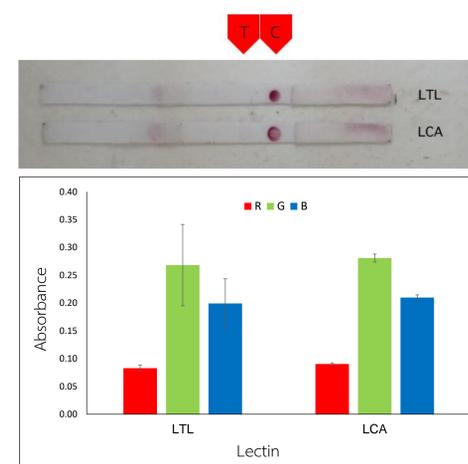
- Lateral flow assay (LFA) is a paper-based platform for the detection and quantification of analytes in complex mixtures, where the sample is placed on a test device and the results are displayed within 5–30 min.
- Hepatocellular carcinoma (HCC) is the most common form of liver cancer. It's an aggressive (fast-growing) cancer most common in people with advanced liver disease, like cirrhosis of the liver.
- Alpha fetoprotein (AFP) is the most widely used tumor marker for hepatocellular carcinoma (HCC). AFP also found in other diseases such as chronic hepatitis and liver cirrhosis.
- Fucosylated alpha-fetoprotein (AFP-L3) is a more specific and sensitive biomarker for early diagnosis of hepatocellular carcinoma (HCC) than only the alpha-fetoprotein (AFP) level.



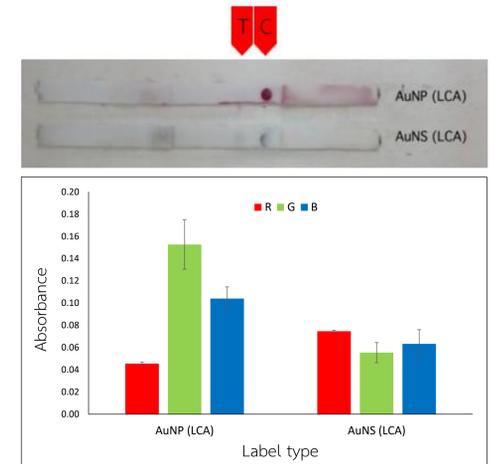
RESULTS AND DISCUSSION



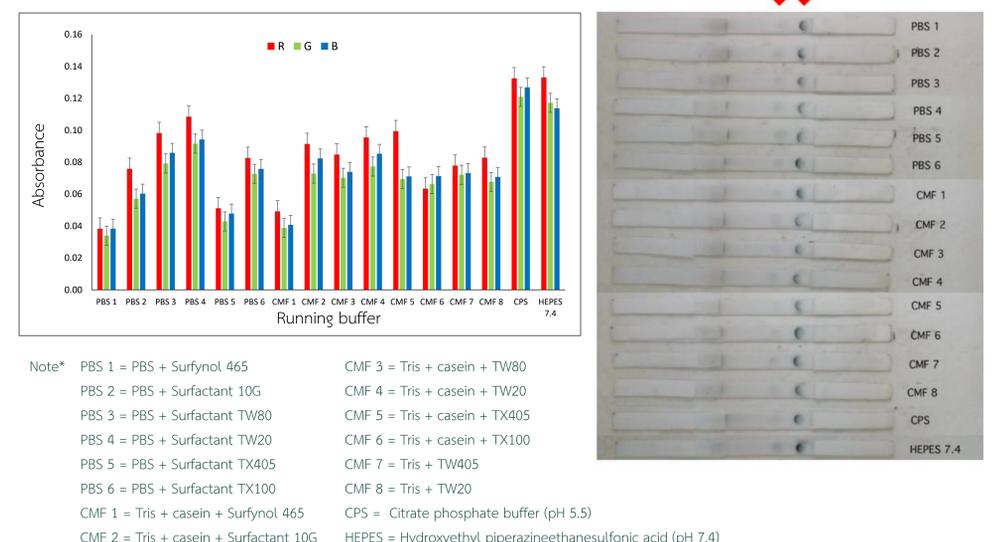
Effect of Lectin Type



Effect of Label Type



Effect of Running Buffer



METHODOLOGY

Studied Parameters

- Effect of lectin type
- Effect of label type
- Effect of running buffer

Test Strip Reader

- Ratio : TL/CL
- Intensity : $I_b - I_s$
- Absorbance : $\log(I_b/I_s)$

Where I_b = intensity of blank
 I_s = intensity of sample

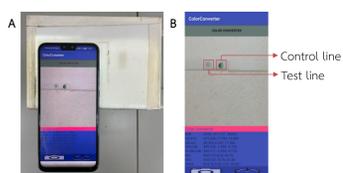
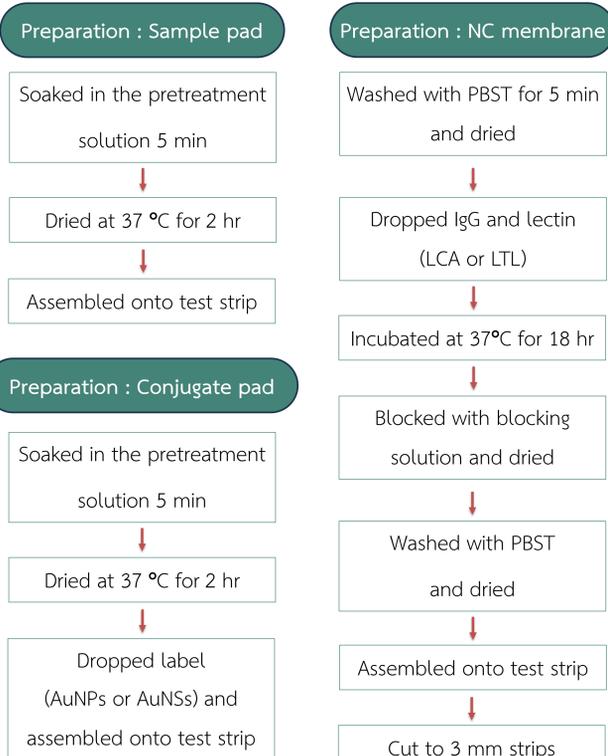


Figure 3 (A) Components of home-made test strip reader under the detection (B) A screenshot of the software program after analyzing the test strip



CONCLUSIONS

- The developed test kit is compact, easy to use, and provides results within 10 minutes.
- Parameters affecting strip performance including lectin type, label type and running buffer have been studied.
- Further improvements are needed to enhance sensitivity, validate with real samples, and compare with standard methods.

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