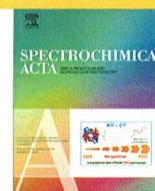


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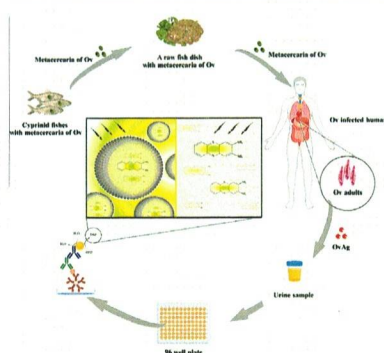
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journal homepage: www.elsevier.com/locate/saaA fluorescence AuNPs-LISA: A new approach for *Opisthorchis viverrini* (Ov) antigen detection with a simple fluorescent enhancement strategy by surfactant micelle in urine samplesWichit Taron^a, Wassana Jamnongkan^b, Jutarop Phetcharaburanin^{a,b}, Poramate Klanrit^{a,b}, Nisana Namwat^{a,b}, Anchalee Techasen^{b,c}, Paiboon Sithithaworn^{b,d}, Narong Khuntikeo^{b,e}, Thidarut Boonmars^{b,d}, Watcharin Loilome^{a,b,*}, Wittaya Ngeontae^{b,f,g,h,*}^a Department of Biochemistry, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand^b Cholangiocarcinoma Research Institute, Khon Kaen University, Khon Kaen, Thailand^c Faculty of Associated Medical Sciences, Khon Kaen University, Khon Kaen, Thailand^d Department of Parasitology, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand^e Department of Surgery, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand^f Department of Chemistry and Center of Excellence for Innovation in Chemistry, Faculty of Science, Khon Kaen University, Khon Kaen, Thailand^g Research Center for Environmental and Hazardous Substance Management, Khon Kaen University, Khon Kaen, Thailand^h Center of Excellence for Environmental and Hazardous Waste Management (EHWM), Bangkok, Thailand

HIGHLIGHTS

- The detection sensitivity of the traditional ELISA assay can be improved by a simple strategy.
- Gold nano particles (AuNPs) are introduced instead of enzymes in the traditional ELISA assay.
- Fluorescent intensity of the indicator dye can be simply enhanced by the formation of surfactant micelles.
- The fluorescence AuNPs-LISA assay has high sensitivity, specificity and accuracy for detecting OvAg in urine.
- The fluorescence AuNPs-LISA is fabricated and used in the diagnosis of OvAg in real urine samples.

GRAPHICAL ABSTRACT



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ABSTRACT

The colorimetric AuNPs-LISA is a new, powerful technique for the detection of *Opisthorchis viverrini* antigen (OvAg) in urine samples. However, the diagnostic sensitivity of the colorimetric AuNPs-LISA is powerless to screen ultralow concentrations of OvAg in urine samples in cases of early stage liver fluke infection. This work, we aimed to improve the diagnostic sensitivity of the colorimetric AuNPs-LISA by developing a new fluorescence AuNPs-LISA. *O*-phenylenediamine (OPD) was used as the chromogenic substrate instead of the tetramethylbenzidine (TMB) of the colorimetric AuNPs-LISA. Interestingly, the fluorescence of the OPD oxidation product by the peroxidase-like activity of labelled AuNPs can be extremely enhanced by a non-ionic surfactant, especially the Triton X-100. The proposed assay exhibited a dynamic linear detection of OvAg concentration in the range of 34.18 ng mL⁻¹ to 273.44 ng mL⁻¹ with the limit of detection at 36.97 ng mL⁻¹ which the detection sensitivity enhancement around 1200-fold when comparing with the colorimetric AuNPs-LISA. This model exhibits high diagnosis sensitivity,

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