

Fabrication of a Potential Point-of-Care Device for Hemoglobin A1c: A Lateral Flow Immunosensor

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Abstract : With the high prevalence of Type 2 diabetes mellitus across the world, the morbidities and mortalities associated with Type 2 diabetes have significant impact on the production line for a nation. With routine scheduled clinical visits to manage Type 2 diabetes, diabetic patients with hectic lifestyles can have low clinical compliance. Hence, it often decreases the effectiveness of diabetic management personalized for each diabetic patient. Here, we report a useful developed point-of-care (POC) device that detect glycated hemoglobin (HbA1c, biomarker for long-term Type 2 diabetic management). In fact, the established POC devices certified to be used in clinical setting are not only expensive (\$ 8 to \$10 per test), they also require skillful practitioners to perform sampling and interpretation. As a paper-based biosensor, the developed HbA1c biosensor utilized lateral flow principle to offer an alternative for cost-effective (approximately \$2 per test) and end-user friendly device for household testing. Requiring as little as 2 μ L of finger-picked blood, the test can be performed at the household with just simple dilution and washings. With visual interpretation of numbers of test lines shown on the developed biosensor, it can be interpreted as easy as a urine pregnancy test, aided with scale of intensity provided. In summary, the developed HbA1c immunosensor has been tested to have high selectivity towards HbA1c, and is stable with reasonably good performance in clinical testing. Therefore, our developed HbA1c immunosensor has high potential to be an effective diabetic management tool to increase patient compliance and thus contain the progression of the diabetes.

Keywords : blood, glycated hemoglobin (HbA1c), lateral flow, type 2 diabetes mellitus

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