Detecting World’s Dengue Fever with Dengue Test Strip: An Innovation of Dengue Rapid Test System

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Dengue fever is a mosquito-borne viral disease. Dengue virus is transmitted by female mosquitoes mainly of the species Aedes aegypti and to a lesser extent, Aedes albopictus. With more than one-third of the world’s population living in areas at risk for infection, dengue virus is a leading cause of illness and death in the tropics and subtropics. Current methods of dengue detection are mostly expensive, time-consuming, and still limited to laboratory testing. That becomes problematic when an epidemic is happening in unsophisticated regions with poor infrastructures and lack of medical facilities. This study developed a rapid test system for dengue fever by building on the proven stabilizing properties of silk fibroin. This rapid test system-named Dengue Test Strip was expected to allow on-site diagnosis and storage at room temperature. Current sandwich ELISA reagents were embedded in silk fibroin solution, allowing storage at room temperature due to its stabilizing properties. Dengue detection after non-refrigerated storage was confirmed by conducting ELISA in a 96-well plate at 0-13 days from initial mixing. Results demonstrate that silk-embedded reagents were able to perform successful detection for up to 13 days of storage. Conversely, dilution with PBS buffer is realizable only when it is freshly mixed. This study showed that ELISA reagents are chemically stable within the silk fibroin solution, allowing Dengue Test Strip to perform on-site diagnosis and storage at room temperature. Detection was performed by dropping 150 µL of water to activate the silk-embedded reagents and initiating flow to the detection pad where a positive result is indicated by a yellow color change in less than 10 minutes.