DETECTION OF DENGUE VIRUS USING A FIELD-DEPLOYABLE PCR SYSTEM: EVALUATION ON HUMAN SERUM SAMPLES IN INDONESIA

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Abstract. Dengue remains an important public health problem in Indonesia. Rapid diagnosis of dengue infection is critical in disease management and control. A pan-dengue virus (DENV) RT-insulated isothermal (ii)PCR assay method, which is a field-deployable system, was evaluated in detection of DENV isolates and human serum samples collected in Indonesia in comparison with a DENV reference multiplex quantitative (q)RT-PCR assay system and a DENV NS1 antigen rapid test. RT-iiPCR and reference qRT-PCR showed comparable sensitivity in detecting DENV isolates of all four serotypes. Compared to composite results of serum samples (two out of the three methods giving the same result, ie 90 DENV positives and 69 DENV negatives), sensitivity, specificity and accuracy of the pan DENV RT-iiPCR assay was 100% [95% confidence interval (CI): 97-100], 100% (95% CI: 96-100) and 100% (95% CI: 98-100), respectively, reference multiplex qRT-PCR assay 98% (95% CI: 94-100), 98% (95% CI: 94-100) and 98% (95% CI: 95-100), respectively, and DENV NS1 antigen rapid test 89% (95% CI: 82-96), 81% (95% CI: 72-91) and 85% (95% CI: 80-91), respectively. Thus, this field-deployable battery-operated pan-DENV RT-iiPCR system should serve as an important tool to facilitate diagnosis of dengue infection in rural and remote communities of Indonesia and other developing countries.

Keywords: dengue virus, human serum, point-of-need detection, RT-insulated isothermal PCR