New rapid test for deadly mosquito-borne virus

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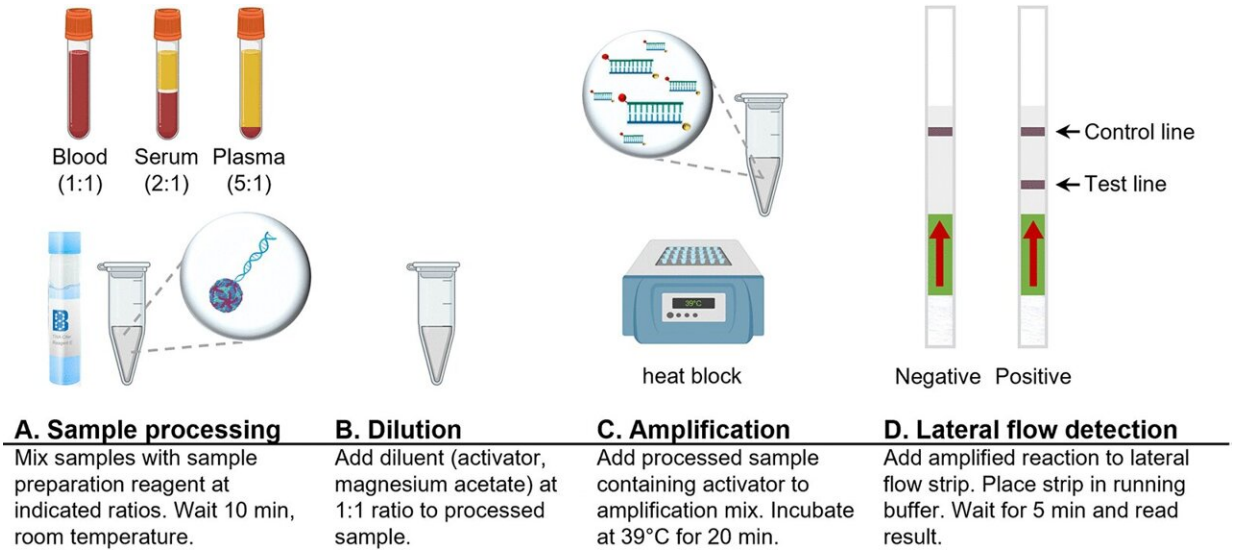

Workflow for rapid dengue serotyping tests. Shown is the basic workflow for rapid dengue serotyping tests, including sample processing, dilution, amplification, and lateral flow detection steps. Credit: *Microbiology Spectrum* (2023). DOI: 10.1128/spectrum.02796-22

University of the Sunshine Coast researchers have developed a rapid portable test for one of the world's fastest-spreading mosquito-borne diseases.

With World Mosquito Day on 20 August marking the ongoing battle against dengue fever in tropical and subtropical countries including

northern Australia, the UniSC research team is taking its findings to the next level.

UniSC Associate Professor of Molecular Engineering Dr. Joanne Macdonald published their results in *Gates Open Research* with co-authors Dr. Madeeha Ahmed and Dr. Nina Pollak.

"We developed a rapid test, with results that look similar to a COVID-19 home stick test, for each of the four types of dengue virus," said Dr. Macdonald. They were sensitive enough to detect even small amounts of viral genetic material in mosquitoes using only pipettes (tubes) and a heating block, instead of expensive laboratory equipment.

"Our entire testing process took about 35 minutes on-the-spot, compared to hours of travel time and PCR processing required for current sampling."

She said the innovative method involved a reagent that inactivated the virus during amplification, enabling simpler, quicker and cheaper detection with a higher level of sensitivity than existing stick tests.

"In practical terms, people and authorities in areas with few resources can set a trap and test mosquitos each week, to check whether dengue is present.

"It has the potential to make mosquito screening more accessible, enhancing surveillance and control efforts in countries where dengue is endemic."

The paper was co-authored by researchers from the QIMR Berghofer Medical Research Institute, Queensland Health and The University of Queensland.

Dr. Nina Pollak has since published a collaborative paper in *Microbiology Spectrum* investigating the potential of using the tests to detect dengue in human serum, plasma and blood.

Adding co-authors from UniSC (Dr. David McMillan and Malin Olsson), Singapore's National Environment Agency, National University of Singapore, UQ and industry partner BioCifer, this paper also supported the advantages of the new method.

"Our tests provided performance and speed without compromising specificity in human plasma and serum and could become promising tools for the detection of high dengue loads in resource-limited settings," Dr. Pollak said.

The team's next goal is to combine each test for the four dengue serotypes into a single test, to further streamline detection.

Dr. Ahmed said the tests aimed to lay the groundwork for future studies focused on actual use and effectiveness in the field.

"We hope the value of our technology will drive interest among users to conduct field trials in regions where the disease is prevalent," she said.

According to the WHO, dengue fever is a painful and deadly disease that infects up to 400 million people every year. It is a viral infection that spreads to people from mosquito saliva infected with dengue viruses. There is no treatment other than for relief of symptoms, which include high fever, head and body aches, nausea and rash.

More information: Madeeha Ahmed et al, Rapid molecular assays for the detection of the four dengue viruses in infected mosquitoes, *Gates Open Research* (2022). DOI: 10.12688/gatesopenres.13534.2

Nina M. Pollak et al, Rapid Diagnostic Tests for the Detection of the Four Dengue Virus Serotypes in Clinically Relevant Matrices, *Microbiology Spectrum* (2023). DOI: 10.1128/spectrum.02796-22