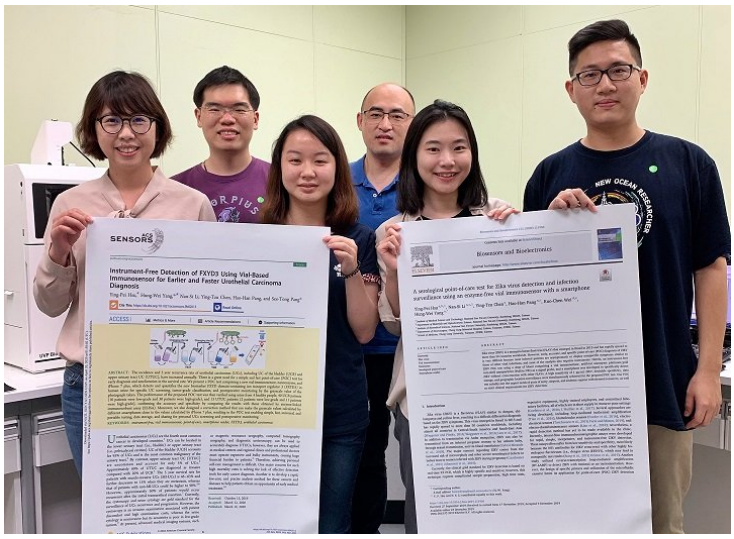
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Taiwan invents mobile healthcare biosensor to detect viral Infections

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The mHealth biosensor allows instrument-free and speedy test results in prostate cancer, urothelial carcinoma, lung adenocarcinoma, breast cancer, ovarian cancer, colorectal cancer, Dengue fever, Zika virus, and Ebola virus



A Postdoctoral Fellow researchers team at the Institute of Medical Science and Technology, National Sun Yat-sen University (NSYSU), Taiwan has invented a Mobile Healthcare Biosensor for Rapid Diagnostic Test and detection of Cancers and Viral Infections.

Cancers and viral infections have been the most critical and global health crises in recent decades, especially the recent outbreak of COVID-19. This pandemic has caused the threat of global health, economy, and worldwide frenzy. To interrupt the virus transmission, a rapid, sensitive, and simple diagnostic test is required urgently. Recently, Dr Hung-Wei Yang, associate professor from the Institute of Medical Science and Technology at National Sun Yat-sen University led an interdisciplinary research team, has successfully developed a mobile healthcare (mHealth) biosensor, a versatile diagnostic tool that can help mitigate the spread of the virus and early detect the risk of cancers to improve the accessibility of global public health care in times like this. Their mHealth biosensor has been proven to accurately evaluate the risk in urothelial carcinomas, prostate cancer and pancreatic cancer. Their research has been published in the high-profile international journals, *Biosensors and Bioelectronics* and *ACS Sensors*, in 2020.

Compared to the traditional diagnostic methods, their mHealth biosensor can be performed on whole blood without filtration, and the test can be easily operated by subjects and quantified by a smartphone with 15 min. These characteristics make it ideal for personal use in early cancer diagnosis, postoperative monitoring, and also in ports of arrival and departure for travellers who come from endemic areas as well as for surveillance and geographical tagging for the infected. The mHealth biosensor allows instrument-free and speedy test results in prostate cancer, urothelial carcinoma, lung adenocarcinoma, breast cancer, ovarian cancer, colorectal cancer, Dengue fever, Zika virus, and Ebola virus.

Not long ago, Dr Hung-Wei Yang's group also applied this biosensing technology for a rapid diagnostic test onCOVID-19. It can be used to detect virus spike (S) proteins /or envelope (E) proteins, human immunoglobulin M (IgM) antibodies, and

human immunoglobulin G (IgG)] simultaneously within 15 min in human whole blood, serum, or saliva with a limit of detection (LoD) of 0.01 ng/mL, which is much lower than current products (i.e., strip-based rapid diagnostic test with a LoD of 65 ng/mL) for COVID-19 protein-based detection. Through a clinical sample test, their biosensing technology can accurately detect the trace IgM antibodies within 15 min in the blood of the first day of hospitalization of the patient who was tested positive by an RT-PCR nucleic acid analysis, indicating that the developed biosensing technology can be used for a rapid diagnostic test of people without obvious symptoms of COVID-19 infection. They expect that this mHealth biosensor will pass clinical trials and come in handy when outbreaks of viral infection diseases happen in the future and can be further applied to detect communicable diseases, caused by such viruses as Zika, Dengue, and Ebola.

Dr Yang and his team will continue to work on developing new technologies for mHealth, which will play an active role in combating the spread of viral infectious diseases and upgrading the global public health care system.