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The smartphone based PCR lab in a bag

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Introduction

Point-of-care (POC) PCR diagnostics has arrived in veterinary medicine. To meet the rising demand for rapid, reliable molecular diagnostic tools for use away from centralized laboratories in vet clinics and even on farms, INDICAL introduces a novel POC PCR platform that transforms your smartphone into a portable lab for the real-time PCR diagnosis of animal diseases. At the heart of it is a handy, ultra-portable qPCR thermocycler. This thermocycler enables multiplex real-time detection of up to 27 targets from a single sample or 9 samples to be tested for up to 3 targets each. It also comes with shelf-stable PCR reagents, meaning no cold chain is required.

The qPCR test results are analysed in real time on your smartphone. In this study, we compared INDICAL's new POC qPCR platform to commonly used real-time PCR thermocyclers to see whether it was just as good or even better at detecting infectious animal pathogens.

Methods

For this study, DNA and RNA samples from different viral pathogens such as African Swine Fever Virus and Influenza A Virus were tested. The purified nucleic acids were then analysed using INDICAL's certified virotype ASFV PCR Kit and the virotype Influenza A RT-PCR Kit on the portable qPCR thermocycler versus the standard protocol developed for central labs and tested on two widely used standard thermocyclers. Furthermore, new lyophilized PCR reagents especially developed for POC diagnostics were tested and first results compared to the performance of the certified lab assays on the different thermocyclers.

Results

Testing ASFV-positive DNA in real time qPCR showed better Ct value results on INDICAL's portable qPCR thermocycler than on the BioRad CFX96.

Influenza A virus-positive RNA was detected with better Ct values on the new portable qPCR thermocycler compared to the Agilent Mx3005P. First tests of the lyophilized PCR reagents show comparable results on the different thermocyclers.

Conclusions

INDICAL's qPCR platform for POC applications with its ultra-portable qPCR thermocycler and hand-held smartphone-based analysis achieved comparable or even better results when compared to the standard molecular lab equipment also used here.

The qPCR thermocycler can also be combined with a novel portable extraction solution using small cartridges to extract nucleic acids without any lab equipment. This ultra-fast POC extraction is currently in validation.

INDICAL's solution for veterinary POC diagnostics also includes the possibility of implementing new PCR assays using lyophilized reagents without the need for a cold chain.