

Handheld analyzer based on Magnotech

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Introduction

Point-of-care (POC) diagnostics is very demanding in a number of areas: performance, ease-of-use, and reliability. We present a handheld instrument based on the Magnotech technology designed with a focus to specifically address these demands.

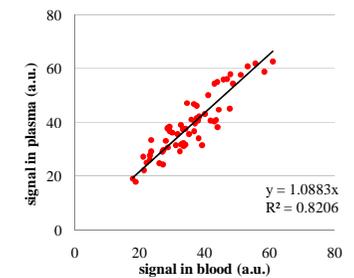


Ease-of-use: Integrated Sample Handling

One of the key elements for ease-of-use is fully integrated sample handling. The disposable cartridge is shown to be suitable for both whole blood and plasma samples to be applied. Using the cardiac troponin-I assay experiments were carried out with finger prick compatible sample volumes (25 µl) of blood and plasma from the same donors. The good correlation obtained with these small samples demonstrates the potential to work with finger prick sample taking.

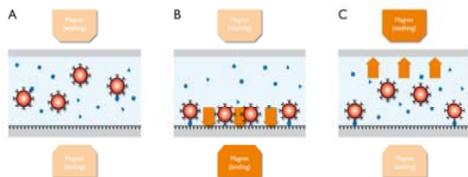


blood-plasma correlation

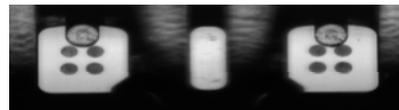


Precision: Magnetic Assay Control

The performance of a POC system should be comparable with the quality that can be obtained in the central lab to be a viable alternative. Not only in terms of sensitivity, but precision is equally important; in particular with respect to the latter there is still a gap between the central lab and current POC systems available. In earlier work we introduced the magnotech technology [1] as an engine for the next generation of diagnostics test. A magnetic concentration step ensures fast binding kinetics whereas the active assay control based on magnetic actuation ensures a good precision. The handheld instrument supports multiplexing with independent magnetic actuation per chamber



Magnetic Assay Principle: a) target capture b) magnetic attraction and c) magnetic wash



Two levels of multiplexing: a) multiple spots per chamber and b) multiple chambers per cartridge

Reliability: Calibration and Control Strategy

An extensive calibration and control strategy ensures reliability of the results. Every disposable cartridge has an RFID tag that contains the calibration information relating to reagents used in that specific unit. The cartridge further has a built-in assay control to check for any potential deterioration of the biomaterials due to incorrect handling of the disposable cartridge during shipping or storage. Finally, the instrument is equipped with a self-test function that assures proper functioning of the analyzer. After completion of the test the data is automatically transferred to the laboratory information system when the analyzer is placed on its docking station.

Production



Master-curve in every cartridge

Transportation



Control assay in every cartridge

Analysis



Analyzer self-test Sample controls

References

[1] D. Bruls et al, Lab on a Chip, 2009, 9, 3504.