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Data Article

Structure and fabrication details of an integrated modularized microfluidic system

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ABSTRACT

This article contains schemes, original experimental data and figures for an integrated modularized microfluidic system described in "An integrated microfluidic system for bovine DNA purification and digital PCR detection [1]". In this data article, we described the structure and fabrication of the integrated modularized microfluidic system. This microfluidic system was applied to isolate DNA from ovine tissue lysate and detect the bovine DNA with digital PCR (dPCR). The DNA extraction efficiency of the microdevice was compared with the efficiency of benchtop protocol.

Specifications Table

Subject area	*Biology*
More specific subject area	*microfluidic*
Type of data	*Table,figure*
How data was acquired	Amplification plots and standard curve plots of qPCR. Digital PCR fluorescent imagines.
Data format	*Raw, analyzed.*
Experimental factors	Use of bovine tissue lysate and ovine tissue lysate to make up different weight ratio (WR) (w/w).

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Experimental features	Tissue lysate was introduced into microdevice for DNA isolation and different WR tissue lysates were detected by digital PCR.
Data source location	*Hangzhou, Zhejiang, China.*
Data accessibility	*Data in public repository.*

Value of the data

- The structure and fabrication details of an integrated modularized microfluidic system are given.
- Amplification plots and DNA yields resulting from on-chip isolation can be compared with the benchtop procedure.
- Data from qPCR were compared with data from dPCR.

1. Data, experimental design, materials and methods

1.1. Microdevice design and fabrication

Integration is increasingly recognized as an important technical challenge in lab-on-a-chip device. More efficient and lower cost integrated microfluidic systems decrease or eliminate reliance on traditional lab equipment. Chin et al. [2] integrated new procedures for manufacturing, fluid handling and signal detection in microdevice into a single 'mChip' assay to replicate all steps of ELISA. Easley et al. [3] developed an integrated microfluidic genetic analysis system that could extract and purify DNA from crude whole blood sample, carry out PCR-based amplification, following by separation and detection in a manner that allows for microliter samples to be screened for infectious pathogens with sample-in–answer-out results.

We have integrated a NA extraction module and a dPCR reaction module on this chip. As shown in Fig. 1, three washing buffer and sample lysate were preloaded in the Teflon tube one by one with air

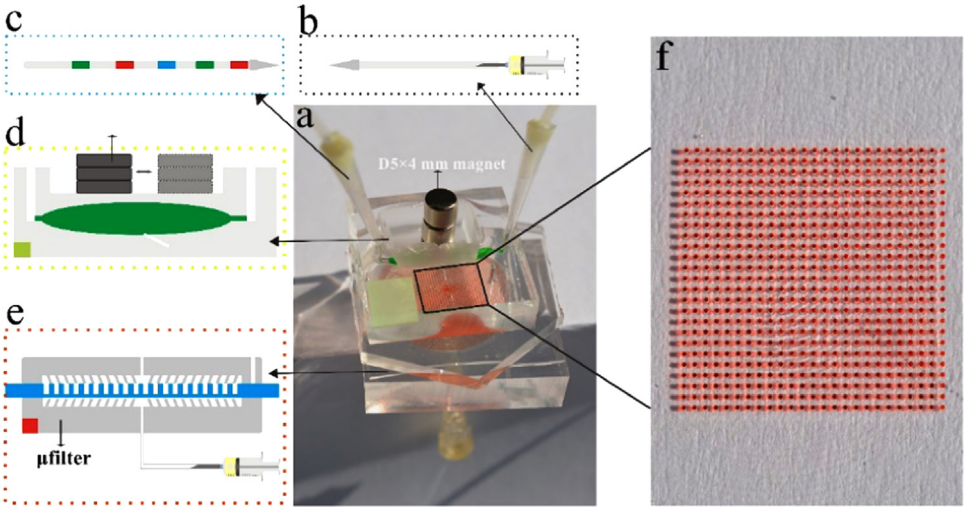

Fig. 1. The integrated NA analysis system. (a) The integrated NA analysis system has two distinct functional modules, NA extraction module (green) and dPCR module (red). (b) A Teflon tube connected a syringe to provide negative pressure. (c) A Teflon tube with different reagents (washing buffer and sample lysate) for NA extraction. (d) The NA extraction module with a magnet sliding in a groove. (e) The dPCR module contained a dPCR region and a μfilter with annular duct (tilted "posts" on the μfilter demonstrated the annular duct). (f) The dPCR region with 650 reaction chambers in a square area 15.0 mm × 15.0 mm.