Poster Abstracts – IFCC – WorldLab – EuroMedLab Berlin 2011 – Berlin, 15-19 May 2011 • DOI 10.1515/CCLM.2011.519 • S597
Clin Chem Lab Med 2011; 49, Special Suppl, pp S1 – S874, May 2011 • Copyright © by Walter de Gruyter • Berlin • New York
Molecular diagnostics

0817

MICROFLUIDIC FLOW-THROUGH DNA PURIFICATION FOR CONTINUOUS MONITORIN G APPLICATIONS

M. Karle[1], G. Czilwik[1], J. Miwa[2], N. Paust[1,2], G. Roth[1,2,3], R. Zengerle[1,2,3], F. von Stetten[1,2]
[1]HSG-IMIT, Wilhelm-Schickard-Straße 10, 78052 Villingen-Schwenningen, Germany; [2]Laboratory for MEMS Applications, Department
of Microsystems Engineering – IMTEK, University of Freiburg, Georges-Koehler-Allee 106, 79110 Freiburg, Germany;
[3]Centre for Biological Signalling Studies (bioss), University Freiburg, Germany
E-mail: marc.karle@hsg-imit.de

Background. The ability to continuously monitor nucleic acid content in a dynamic sample would allow significant progress in numerous
fields, such as monitoring of bioprocesses, air, water, extracorporeal blood,and many other samples. Until now, a device for continuous extraction of DNA from a crude sample has not been available and was hence developed by our lab.

Methods. A mixture of cell lysate and superparamagnetic DNA-binding beads is continuously injected into a microfluidic chip. Circularly arranged microchannels guide different buffer flows around a central rotating permanent magnet. The magnet attracts the DNA carrying beads towards the inner part of the channels and ensures their transfer across the laminar interface, thus continuously
performing the three essential steps in DNA purification: separation, washing, elution.

Results. Genomic DNA from *E. coli* lysate was continuously purified on-chip. Syringe pumps controlled the flow of sample and extraction reagents. An inlet flow of 11.9 $mm \cdot s^{-1}$ (0.75 $\mu l \cdot s^{-1}$) led to an average bead velocity of 0.7 $mm \cdot s^{-1}$ and a sample transition
time of approximately 2 minutes. Subsequently, the extracted DNA was amplified off-chip via qPCR. In dilution series, the continuous on-chip purification showed linearity over 7 orders of magnitude and recovered 150 ± 50 % of total DNA compared to batch-wise reference purifications.

Conclusions. We have successfully established a microfluidic platform for flow-though DNA extraction from lysate. With appropriate
surface modification of the magnetic beads the chip also allows for continuous purification of other biomolecules such as RNA, proteins or even cells, including their subsequent real-time analysis.