**Towards continuous detection of cell metabolites in lab on a chip devices**

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**Introduction**

Quantification of cell metabolites is critical for understanding the dynamic cellular metabolism and subsequently disease development and its treatment [1-3]. The current work on lon term and continue detection of metabolites is limited. This paper reports the development of a lab on a chip device for continuous detection of cell metabolites.

**Methods**

The micro device consists of a cell culture zone, a micro reactor and a detection zone. HUVEC cells were used as the model cells. Glucose was chosen as the model analyte for this study. The glucose uptake of HUVEC cells was measured for a period of 20h. An injection analysis protocol was used for biochemical analysis of the cell culturing. 0 μl DMEM medium with the glucose concentration of 300 μM was pushed into the culture zone with the rate of 1μl/min every 2 hours. A laser induced fluorescence method was used to detect glucose with Amplex Red as the indicator. The serpentine region of the micro reactor is the site of the enzymatic reaction of metabolite and indicator

**Results**

The single cell screening and releasing capabilities of this device are experimentally tested. The Fig. 1a shows the dose response curve of glucose detection of the system, with the concentration response range of 20~300 μM and the LOD of 10 μM. Fig. 1b shows the measured glucose concentration. As the cells grow and divide, the consumption of glucose by cells gradually increases, almost linearly in the first 10 hours, and reaches a steady value towards the end of testing. The rate of glucose consumption by the cells is calculated to be 17 nmol/105 cells·h, which is comparable to the results in the published literature[4,5].

**Conclusions**

A cell-based microfluidic device has been developed for continuous detection of cell metabolites. It has been demonstrated to detect glucose consumption of HUVEC cells over 20 hour period. This has the potential for long term real-time analysis of cell metabolism.

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Fig. 1 a) Dose response of glucose detection

b) HUVEC cells glucose uptake during the 20 hour test period.

1. (b)

**References**

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