



Towards single cell heat shock protein expression by means of hydrodynamic trapping



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Context Heat shock proteins (HSPs) can be found in most living cells, ranging from simple eukaryotic organisms to humans. Their expression is increased when the cells are exposed to environmental stresses; e.g. increased temperature, infections and toxins. HSPs are playing an important role in the cells own repair mechanism [1]. Currently biomedical researchers are investigating the use of HSPs for producing highly efficient anticancer vaccinations as well as for anticancer inhibitor agents [2]

Objectives The study of HSP expression is often based on a temperature induced stress. Usual experiments are performed under thermostat and isothermal heating of the cell culture. However, understanding single cell mechanisms would require local and short time heating experiments. A precise positioning of isolated cells is therefore mandatory. Such lab on chip micro systems might contribute in the quest of finding novel and efficient anti-cancer therapies.

Methods We propose to approach the mentioned challenge by hydrodynamically trapping the cells. The trap will have an incorporated heater. By this method it might be possible to precisely trap cells and conduct localized heat experiments.

Results The hydrodynamic trap has been designed and fabricated using standard PDMS molding techniques. First trapping experiments showed a high trapping efficiency. Figure one shows the finished microfluidic device in an optical setup. Figure 2 shows a successfully trapped 5µm fluorescent bead.

References and Publications

- [1] S. Dai, L. Jiang, G. Wang, X. Zhou, X. Wei, H. Cheng, Z. Wu and D. Wei, *J Cell Mol Med* 14 (3), 710-725 (2010).
- [2] A. Sharma, A. S. Meena and M. K. Bhat, *Cancer Sci* 101 (5), 1186-1193 (2010).

Maurizio R. Gullo *et al*, "Towards Single cell level heat shock protein expression by means of hydrodynamic trapping and local heating", MFHS-2012 conference (1st. International conference on MicroFluidic Handling Systems), Enschede, The Netherlands, 10-12 Oct., 2012 (Best poster award).