McSPIM – A MICROFLUIDIC CAPILLARY APPROACH FOR SELECTIVE PLANE ILLUMINATION MICROSCOPY

Thomas Bruns*, Sarah Schickinger, and Herbert Schneckenburger
Hochschule Aalen, Institut für Angewandte Forschung, D-73430 Aalen, Germany
*corresponding author; e-mail: thomas.bruns@htw-aalen.de

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ABSTRACT
A microfluidic system combined with an illumination device for light sheet based fluorescence measurements in a conventional inverse microscope is described, and first experimental results are shown [1]. This opens up new perspectives of kinetic measurements in fluorescence diagnosis upon low amounts of drugs and short application times.

A micro-capillary - holding the sample - is combined with application of a microfluidic device, which easily permits the application of e.g. nutrients, pharmaceutical agents or fluorescent dyes without moving or affecting the probe (depicted in Figure 1). Multi-cellular spheroids consisting of 20,000 to 50,000 cells are used for preliminary tests and for demonstration of the potential of the microfluidic system in cancer research, e.g. for detection of cellular responses to anticancer drugs. The system provides variation of the flow rates and flow temperature. The cell spheroids [2] are located in a micro-capillary, and a light sheet for illumination is generated in an optical setup mounted to a conventional inverse microscope (see Figure 2). Layers of the sample of about 10 µm thickness are thus illuminated selectively with low light exposure, and imaged by high resolution fluorescence microscopy. Especially when combined with selective plane illumination microscopy (SPIM) this microfluidic capillary approach proves to be an essential advantage in sample preparation [1].

SELECTED REFERENCES