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Description:

To study the adapted metabolism of pathogens during the infection of mammalian host cells, it is essential to take and treat samples under representative physiological conditions. This project aims at the development of an **automated rapid sampling unit (RSU) and its integration into a real-time controlled culture system**. To overcome some of the intrinsic limitations of the macroscopic sampling approach, we started our work on a **microfluidic sample processing system (μ SP)**, which includes modules for micromixing, cell disruption and separation of host and pathogen cells. The integration of these crucial steps into a lab-on-chip device and the interfacing of the periphery (controlled cultivation and external fluid control) are intriguing parts of this project. First of all, the combination of the RSU and μ SP sampling approach will be used in a complementary approach for the profiling of the metabolism of a selected host/pathogen system for the proof-of-principle. In a next step, we are planning to use the developed hardware as a **technology platform** for the study of biological questions which cannot be tackled with conventional methodology alone.

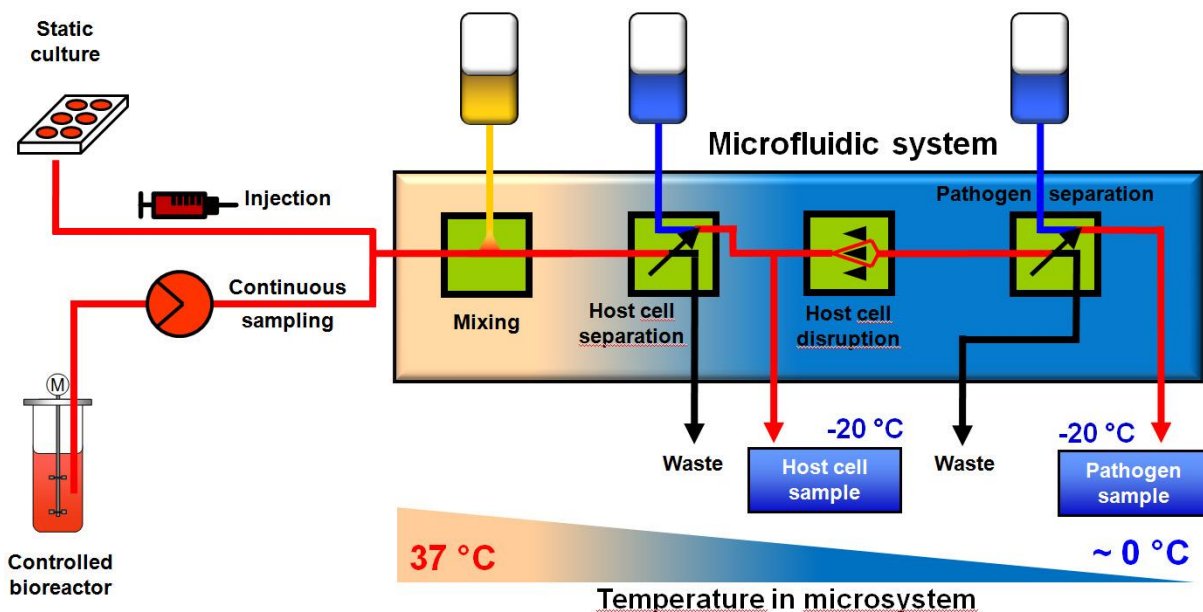


Fig. 1. Microfluidic sample processing for the determination of individual metabolite concentrations in host and pathogen cells. Cultivation and metabolite analysis are implemented off-chip using conventional techniques and only the crucial steps of sample preparation are integrated on-chip to make use of the advantages of rapid heat and mass transport and accurate fluid control.

References (selected)

Wurm M, Schoepke B, Lutz D, Mueller J and Zeng AP (2010). Microtechnology meets systems biology: The small molecules of metabolome as next big targets. *Journal of Biotechnology*, 149(1-2):33–51.

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