

DNAUTOMAT - INTEGRATED LAB-ON-A-CHIP DEVICE FOR IMPROVED PATHOGEN CHARACTERIZATION



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Infektiologie

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Brief summary:

Infectious Diseases are amongst the major concerns in clinical routine including the steadily increasing problems with multiple antibiotic resistances. Amongst most serious illnesses are respiratory tract infections, bloodstream infections, soft tissue- and wound infections. Bloodstream infections are the major cause of death in intensive care units. Therefore an early diagnosis is crucial. Infectious diseases can be caused by a lot of different pathogens and the severity of an infection is influenced by the pathogen species and its antibiotic resistances.

Common methods in clinical routine are based on pathogen cultivation thus lasting at least 2 to 3 days until final pathogen characterization. Manual DNA based methods have the disadvantage of a high contamination risk and the correlation between genotypic and phenotypic results was found to be low. Therefore, it is of importance to investigate the possibility of fast and automated pathogen separation from clinical samples, combined with accelerated cultivation-based antibiotic resistance determination, which would allow a much earlier and faster initiation of a well targeted antibiotic therapy.

In this proposal we present an approach for bacterial DNA isolation, detection and characterization including genotypic on chip antibiotic resistance determination. In the first stage the bacterial DNA is isolated from a complex biological sample and transferred on the DNA analysis microarray. Using multiplex PCR the target genes will be amplified within an microfluidic system and the products will be fluorescently labelled. A hybridisation chamber will be included in the system with an automated read-out system.

Keywords:

Pathogen, Antibiotic resistance, Lab-on-a-Chip, Microfluidic, Infectious diseases,