

Technology Offer

Profiling of antimicrobial susceptibility and phylogenetic relations

Reference Number 02-00336

Challenge

Infections with carbapenem-resistant Enterobacteriaceae (CRE) e.g. *Klebsiella pneumoniae* were classified with the hazard level *urgent* by the Centers for Disease Control and Prevention (CDC). This implies that CRE infections require urgent public health attention to identify infections and to limit transmission.

Strategies to manage CRE and other nosocomial infections include not only the development of new anti-microbial compounds and the rational use of antibiotics, but also early diagnosis for targeted treatment and the implementation of effective infection control principles.

Thus, establishing a powerful surveillance system is essential to identify routes of contamination and modify the hygiene regime. These changes will help to significantly decrease hospital acquired infections and to prevent outbreaks. Such a system must include identification of species, antibiotic resistances and phylogenetic relations. These challenges are solved by the new, fast, cost-effective and robust antimicrobial susceptibility and phylogenetic identification method.



Multidrug-resistant *Klebsiella pneumoniae* are known to cause severe hospital-acquired infections.
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Technology

The technology is based on the determination of markers for antibiotic resistance and phylogenetic relationship by detection of single nucleotide polymorphisms (SNPs). In a first step patient probes are used to identify present species using PCR techniques. In a second step a species specific primer set is used for multiplex PCR and mass spectrometric analysis. The results show species specific SNP profiles. On the basis of antibiotic resistance markers present in the probes an effective antibiotic treatment can be recommended by using active compounds.

The second read out of the SNP profiles is phylogenetic relationship of the investigated probes. Using this data enables clinical microbiologists to follow the spread of one clone from one patient to another.

Monitoring of whole hospitals or departments makes it possible to identify those activities or spaces that are critical for infections and implement an overall surveillance infrastructure. If critical procedures and areas are optimized the risk of outbreaks can be minimized in the future and morbidity and mortality can be reduced. Consequently cost for the health care system can be lowered.

SNP profiling is performed after species identification in 384-well microplates using multiplex PCR and mass spectrometry. This experimental setup makes the assay very fast, robust and cheap.

Commercial Opportunity

The invention is offered for licensing and co-development.

Development Status

The proof of concept was shown in 800 clinical *Klebsiella pneumoniae* isolates. The sensitivity of the SNP profiling assay is currently validated. The assay is applicable for other multi-drug resistant gram-negative opportunistic pathogens.

Patent Situation

European patent application was filed in January 2017. PCT Application was filed in January 2018.