

## Detection and Differentiation of the most prevalent Carbapenemase Genes.



Among gram-negative bacteria carbapenemase-producing species represent an increasing threat worldwide. Especially within the *Enterobacteriaceae* group widespread affiliates like *E. coli* and *Klebsiella pneumoniae* show a tremendous variety of resistance-mediating carbapenemase genes. But even in other species like *Pseudomonas aeruginosa* or *Acinetobacter baumannii* variable carbapenem resistances can be found.

From an epidemiologic point of view distinct molecular entities additionally differ from country to country. Thus the KPC enzymes - meanwhile relevant to several *Enterobacteriaceae* - emerge predominantly e.g. overall in the USA and in a remarkable quantity in Brasil, China, Israel, Italy and Greece. Indeed the *Klebsiella pneumoniae* carbapenemase KPC, as well as the Verona integron-encoded metallo- $\beta$ -lactamase (VIM), New Delhi metallo- $\beta$ -lactamase (NDM) and OXA-48 number among the most important carbapenemases in a global perspective. Worth mentioning that OXA-48 followed by KPC and VIM-1 is most commonly identified in Germany accompanied by a steady rise of NDM-1 in recent years.

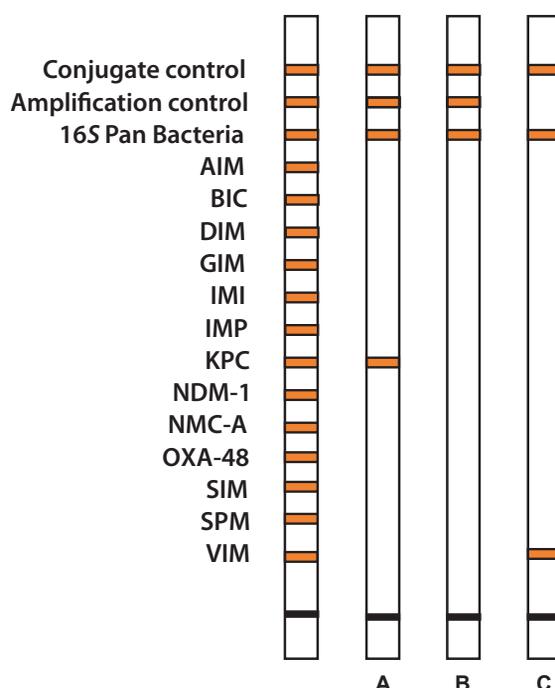
**Carbapenemases are classified with three distinct groups. By use of the AID Line-Probe-Assay following carbapenemases can be detected and differentiated in a reliable manner:**

**Penicillinases (Class A):** KPC, IMI, NMC-A, BIC

**Metallo- $\beta$ -Lactamases (Class B):** IMP, VIM, NDM, AIM, DIM, GIM, SIM, SPM

**Oxacillinases (Class D):** OXA-48

- Our tests are being developed to enable an initial screening of the most common carbapenemases on one single hybridization strip.
- Specific detection of up to 13 different carbapenem resistances plus function controls, i.e. conjugate control, amplification control and bacterial 16S rDNA band control.
- Suitable specimens: bronchial lavage, sputum, smear tests, bacterial cultures



### Sample data interpretation:

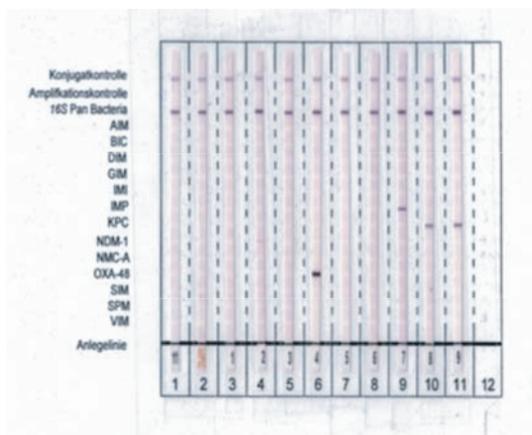
**Probe A:** 16S Pan Bacteria control and KPC carbapenemase gene have been fully developed -> probed pathogen appears to be positive with regard to the investigated carbapenem resistance.

**Probe B:** 16S Pan Bacteria control has been fully developed only -> probed pathogen shows no sign of carbapenem resistance.

**Probe C:** 16S Pan Bacteria control and VIM carbapenemase gene have been fully developed -> probed pathogen appears to be positive with regard to the investigated carbapenem resistance. Due to the bacterial culture derived specimen the amplification control is lacking in this case.

## AID Carbapenemase line probe assay

Clinical strains isolated in the routine diagnostic laboratory



### Conclusions / final remarks

- Carbapenemase producing Enterobacteriaceae are increasing
- There is a high need for fast and accurate screening
- Recently, a few commercial multi-plex PCR tests have been developed
- We have developed in collaboration with AID Diagnostika a AID Carbapenemase Line Probe Assay, which is able to detect 13 different carbapenemase genes
- The AID Carbapenemase Line Probe Assay is highly specific, easy to use and implemented in the routine diagnostic laboratory

"Presentation REMMDI 2015, Bloemberg"

## Technical data

**Suitable specimens:** bronchial lavage, sputum, smear tests, bacterial cultures

**Time to result:** Approx. 5 hours

## Methodology

Reverse hybridization:  
Hybridization strips included in the AID test kit will be incubated with amplified DNA probes of your specimen. After a following stringent wash step specifically bound biotinylated sequences will be tagged with a streptavidin-enzyme-conjugate. Visualization on the test strip runs simply by addition of substrate.

### Documentation and analysis using the AID Scanning System.

**All-in-one solution for an automated process, starting from DNA isolation up to the detection and interpretation of your results.**

## Literature:

**Epidemiologisches Bulletin: Nr. 43, 27. Okt. 2014 Robert Koch-Institut**  
Bericht des Nationalen Referenzzentrum für gramnegative Krankenhaus-erreger (1. Januar 2013 bis 31. Dezember 2013; p421-425

**Epidemiologisches Bulletin: Nr. 19, 13. Mai 2013 Robert Koch-Institut**  
Zur aktuellen Situation bei Carbapenemase-bildenden gramnegativen Bakterien; Bericht des Nationalen Referenzzentrum für gramnegative Krankenhaus-erreger ; p168-171

**Lupo A. et al. (2013):** Non-phenotypic tests to detect and characterize antibiotic resistance mechanisms in Enterobacteriaceae; Diagn. Microbiol. Infect. Dis. 77(3); p.179-194

**Lynch, J. P. et al. (2013):** Evolution of antimicrobial resistance among Enterobacteriaceae (focus on extended spectrum beta-lactamases and carbapenemases); Expert Opin. Pharmacother. 14(2), p 199-210

**Additional literature is available on request from AID!**

## PCR-Infektions-Kits

Order-No.	Product
RDB2290	Carbapenemasen
RDB2135	CAP Bakterien $\epsilon\epsilon_{123}$
RDB2140	CAP Viren
RDB2145	CAP Resistenz
RDB2200	Bordetella pertussis
RDB2147	MRSA combi
RDB2180	ESBL
RDB2185	TB-Modul Isoniazid, Rifampicin
RDB2184	TB Modul Aminoglykosid
RDB2187	TB Modul Fluorochinolone

All PCR Kits are available in two sizes. For low-throughput we offer 12 tests per kit and for high-throughput 60 test per kit!

**For more information about our products,  
please visit our website:**

**www.aid-diagnostika.com**

