P-047

Evaluation of a new lateral flow assay for the detection of OXA-23-producing bacteria

P. Bogaerts, S. Evrard, W. Bouchahrouf, M. Hoebeke, C. Berhin, T.-D. Huang, and Y. Glupczynski

National Reference Center for Antimicrobial Resistance in Gram-Negative Bacteria, CHU UCL Namur

Mailing address: Pierre Bogaerts
Laboratory of Microbiology,
CHU Dinant-Godinne (UCL Namur),
1 Avenue Dr. G. Therasse, 5530 Yvoir, Belgium
Email: pierre.bogaertsi@uclouvain.be

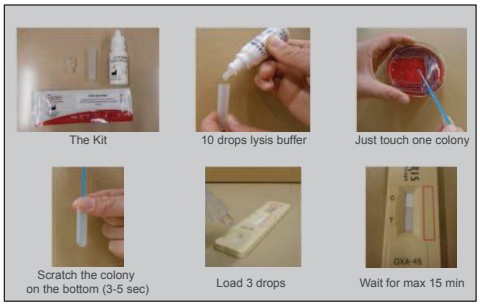
Introduction & Objectives

- Rapid detection of OXA-carbapenemase in *Acinetobacter spp*. is essential for early appropriate infection control purposes.
- Currently available colorimetric hydrolysis based tests such as Carba NP seems less suited for the detection of the OXA-carbapenemases specific to *Acinetobacter.*[1]
- Lateral flow immunochromatographic assays (ICAs; for direct confirmation of OXA-48-like, KPC, VIM, IMP and NDM carbapenemases are available on the market. (Coris bioConcept and NG Biotech).[2-3]
- Here we have evaluated a **new OXA-23 detecting ICA developed by Coris bioConcept (Gembloux, Belgium)** .

Methods

- ***Bacterial strains*:** A **retrospective** evaluation was performed against a collection of **252 *Acinetobacter* spp**. (*A. baumannii* [n=208], *A. pittii* [n=19], other Ac*inetobacter spp*. [n=18]) with well characterized resistance mechanisms to β-lactam agents. The collection comprises **143 OXA-23-like** producers, **25 OXA-24-like** producers, **32 OXA-58** producers, **1 OXA-143**. The collection also includes one class A carbapenemase (GES-14), 17 metallo-beta-lactamase (**NDM [n=13], VIM [n=1]** and **IMP [n=3])** and **45 non-carbapenemase producers** (Table). All isolates in the collection panel had been previously characterized for the presence of beta-lactamases genes by using PCR/sequencing as previously described (and used as reference gold standard.[4]
- ***Reading and data recording*:** The **OXA-23 *K*-SeT®** assay is a lateral flow assay commercialized by Coris BioConcept (Gembloux, Belgium) for the detection of OXA-23-like. For this study, the strains to be tested were grown on **5% sheep blood trypticase soy agar** bioMérieux, Marcy l'Etoile, France) for 16–24 h at 37°C. The tests were performed according to **the manufacturer's recommendations (Fig. 1)**.The **results** were interpreted by **2 independent technologists** and the **time of apparition** of the band corresponding to **OXA-23** was recorded by the first technologist.
- ***Performance analysis:*** Sensitivity and specificity of the OXA-23 ICA was determined by **comparing to** the results of multiplex **PCR-sequencing** targeting carbapenemase on all tested strains.

Fig 1. Operating procedures of VIM *K*-SeT is identical to the procedure of OXA-48 K-SeT (Coris BioConcept)



Results

- On **252 *Acinetobacter* spp**., the assay performed **100 % sensitivity (CI95: 96.7-100 %)** and **100 % specificity (CI 95: 96.2-100 %)** using PCR as comparator
- For *Acinetobacter* spp. the **time to positive results** varied from **0.5 to 5.5 minutes** (mean: 1.25 min +/- 0.62 min; **median: 1.20**)
- OXA-23 variants like **OXA-27 are also well detected** while OXA-24 (OXA-72, OXA-255) and OXA-58 are not

Table Species and carbapenemase variants evaluated with the OXA-23 *K*-SeT® *A. spp.* includes *A. baumannii, A. pittii and* other rarer species

Species	*Carbapenemase*	*N° of isolates*	*OXA-23 K-SeT*	*Time to signal (Min)*
Class D OXA-23-like				
A. spp.	OXA-23	129	+	0.5 to 5.5
A. baumannii	OXA-27 (OXA-23 like)	1	+	1.5
Class D + D				
A. baumannii	OXA-58 + OXA-23	1	+	1
A. haemolyticus	OXA-58 + OXA-23	1	+	1
Class B + D				
A. baumannii	NDM-1 + OXA-23	2	+	0.8 and 1
A. baumannii	NDM-2 + OXA-23	1	+	0.8

Species	Beta-lactamase	N° of isolates
Class A		
Acinetobacter baumannii	GES-14	1
Class B		
Acinetobacter spp.	NDM-1	13
A. junii	IMP-1	1
A. baumannii	IMP-4	1
A. baumannii	IMP-14	1
Acinetobacter spp.	VIM-4	1
Class D		
Acinetobacter spp.	OXA-58	30
A. baumannii	OXA-72 (OXA-24 like)	22
A. baumannii	OXA-24	2
A. baumannii	OXA-143	1
A. pittii	OXA-255 (OXA-24 like)	1
A. pittii	VIM-4 + OXA-58	1
Non carbapenemase producers		
Acinetobacter spp.		42

Fig 2. Example of OXA-23 *K*-SeT® results obtained for OXA-23 producers and non-producers

Ab: *Acinetobacter baumannii*

Ab OXA-23 | **Ab NDM + OXA-23** | ***A. pittii* OXA-23** | **Ab OXA-27** | **Ab OXA-72** | **Ab NDM-1** | ***A. pittii* OXA-58 + VIM-4**

All OXA-23 non-producers presented a negative results for OXA-23 *K*SeT. No cross reactivity

Conclusions

- The OXA-23-*K*-SeT® ICA is a **reliable** and convenient tool for direct rapid detection of OXA-23-producing *Acinetobacter spp.* This assay may be of particular interest because of the lack of efficient phenotypic confirmatory tests for detection of OXA-carbapenemases in *Acinetobacter spp*.
- **Further development** for the detection of other OXA-carbapenemases (**OXA-24, OXA-58, …**) found in *Acinetobacter* is needed.

References

1. **Noël A et al. Comparative Evaluation of Four Phenotypic Tests for Detection of Carbapenemase-Producing Gram-Negative Bacteria. J Clin Microbiol. 2017; 55:510-518.**
2. **Kolenda C et al. Evaluation of the new multiplex immunochromatographic O.K.N.V K-Set assay for the rapid detection of OXA-48-like, KPC, NDM and VIM carbapenemases. J Clin Microbiol 2018; 56: e01247-18.**
3. **Hopkins KL et al. Evaluation of the NG-Test CARBA 5 multiplex immunochromatographic assay for the detection of KPC, OXA-48-like, NDM, VIM and IMP carbapenemases. J Antimicrob Chemother 2018; Epub ahead of print.**
4. **Bogaerts P** *et al.* Validation of carbapenemase and extended-spectrum beta-lactamase multiplex endpoint PCR assays according to ISO 15189. *J Antimicrob Chemother* 2013; 68: 1576-82.

Funding and acknowledgements

- The national reference center (NRC) is partially supported by the Belgian Ministry of Social Affairs through a fund within the health insurance system. We thank all Belgian microbiologist colleagues for referring their clinical isolates to the NRC.
- This study was supported in part by a research grant from the Region Wallonne under the CWALity convention n°1318265, project FEAR (Fighting *Enterobacteriaceae* Antibiotic Resistance).