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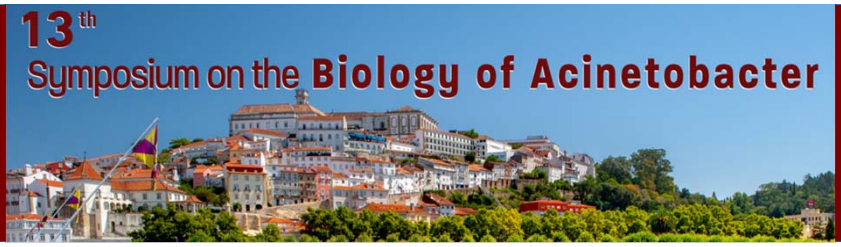

Evaluation of novel immunological rapid test (Resist Acineto) Rapid Detection of acquired Carbapenemase Producers in *Acinetobacter* sp.

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Objectives :

Resistance to carbapenems in *Acinetobacter* spp. is a serious problem that is increasing worldwide. Almost all carbapenem-resistant *A. baumannii* strains produce an acquired class D (OXA-23, OXA-40, OXA-58) or class B (NDM, VIM, IMP) carbapenemase.

The aim of this study was to evaluate the performance of the novel immunological rapid test, namely the "RESIST Acineto" (CORIS BioConcept), for the detection of the major acquired carbapenemases (OXA-23, OXA-40, OXA-58 and NDM) identified in *Acinetobacter* spp.

Figure 1 : Resist Acineto kit (Coris BioConcept)

Methods :

175 well-characterized carbapenemase and non-carbapenemase producing *Acinetobacter* species from the Swiss National Reference Center for Emerging Antibiotic Resistance were tested, including:

- 149 *A. baumannii*
- 12 *A. pittii*
- 4 *A. radioresistens*
- 3 *A. ursingii*
- 2 *A. calcoaceticus*
- 2 *A. nosocomialis*
- 1 *A. bereziniae*
- 1 *A. lwoffi*
- 1 *A. junii*

The acquired carbapenemase types were distributed as follows:

- OXA-58 (n=25),
- OXA-40 (n=31),
- OXA-72 (n=3),
- OXA-23 (n=37),
- NDM (n=5).

Noteworthy, 28 isolates co-produced two acquired carbapenemases:

- NDM + OXA-23 (n=10),
- OXA-23 + OXA-40 (n=6),
- NDM + OXA-40 (n=8),
- NDM + OXA-58 (n=4).

The tests were performed following the protocol below (Figure 2) :

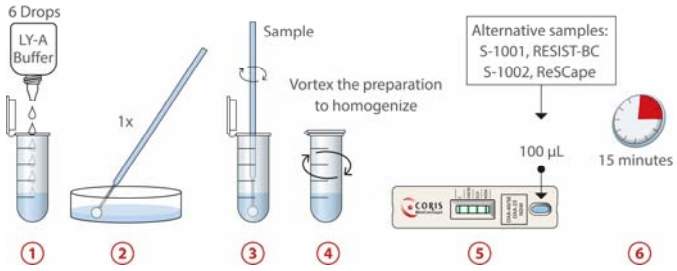

Figure 2 : Protocol for Resist Acineto kit (Coris BioConcept)

Results :

Table 1 : Analyse of the Results of Resist Acineto kit (Coris BioConcept)

Tested gene	Sensitivity	Specificity	Reliability	Comment:
OXA-40/-58	100%	87.8%	93.1%	12 False positive *A. pittii*
OXA-23	100%	96.7%	97.7%	4 False positive *A. radioresistens*
NDM	100%	100%	100%	N/A
OVERALL	100%	95.6%	97%	N/A

False positive analysis :

- ***Acinetobacter radioresistens*** naturally produce an OXA-23 like enzymes
- ***Acinetobacter pittii*** naturally produce an OXA-213 like enzyme, it's closest identity being to OXA-40.

To confirm this cross reaction, the OXA-213 like encoding gene was cloned into plasmid pCR-BluntII-Topo (Invitrogen, Thermo Fisher) and transformed into *Escherichia coli* TOP10.

Then the recombinant strain was tested giving positive results for OXA-40 /-58 line.

Figure 3 : Results of Resist Acineto kit (Coris BioConcept)

The test performed very well, after exclusion of the results obtained for the *A. pittii* and *A. radioresistens* isolates, no false positivity result was observed; **sensitivity, specificity and reliability values were 100%.**

Conclusions:

The Resist Acineto test is a rapid, easy to perform, and showed an overall good specificity for detecting different variants of the four most common carbapenemases identified in *Acinetobacter* spp. Given its user friendliness, simplicity, and short time-to-result, this test is suitable for microbiology laboratories.