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Diversilab® Bacterial kit versus species-specific Diversilab® kits for rep-polymerase chain typing of nosocomial pathogens

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INTRODUCTION

Diversilab® (DL) repetitive sequence polymerase chain reaction (rep-PCR) typing implies the use of specific kits per bacterial species. A pan-bacterial test system, the Diversilab® Bacterial kit, is also available. The use of this universal kit with greater flexibility and instant availability can be attractive in outbreak management. Therefore, the value of the Bacterial DL kit was compared to a limited set of species-specific DL kits.

OBJECTIVES

To evaluate the performance of the DL Bacterial kit compared to the species-specific DL kits for five commonly isolated species in hospital outbreaks: *Staphylococcus aureus*, *Enterobacter cloacae*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*.

MATERIALS AND METHODS

Strains were selected based on their DL species-specific typing results. Per species, minimum five different DL types were chosen. Fifty-three strains derived from outbreak related samples were analyzed: *S. aureus* (n=10), *E. cloacae* (n=12), *E. coli* (n=10), *P. aeruginosa* (n=12) and *K. pneumoniae* (n=9). All strains were typed with both the species-specific DL kit and the DL Bacterial kit according to the manufacturer's instructions. Peak-patterns were analyzed with the web-based DL software using Pearson correlation coefficients to determine the degree of similarity between the strains (similarity index). Strains with two peak difference were designated as closely related, strains with more than two peak difference were different. Discordant results were analyzed with pulsed field gel electrophoresis (PFGE).

RESULTS

With DL Bacterial kit, amplification of the repetitive sequences of the *S. aureus* strains failed. Only one strain had interpretable peak patterns. Re-analysis did not gave better results.

For *E. cloacae*, one discordant result was found between DL Bacterial and DL Enterobacter kit (Figure 1(a)). In contrast to the DL Enterobacter kit and PFGE typing, one strain could not be distinguished from two other strains with DL Bacterial kit.

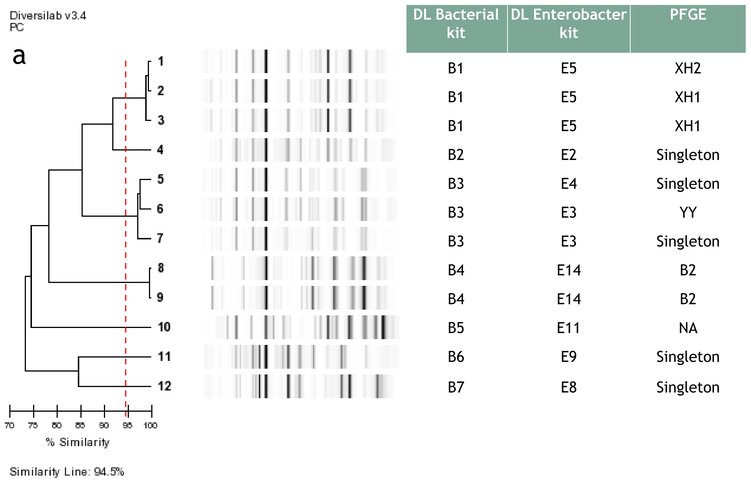
Similar results were found for *E. coli* (Figure 1(b)). One strain could not be distinguished from others by DL Bacterial kit while the DL species-specific kit could.

For *P. aeruginosa*, DL species-specific kit and DL Bacterial kit gave identical results, except for one strain where the DL Bacterial kit was more discriminatory compared to the DL Pseudomonas kit and PFGE (Figure 1(c)).

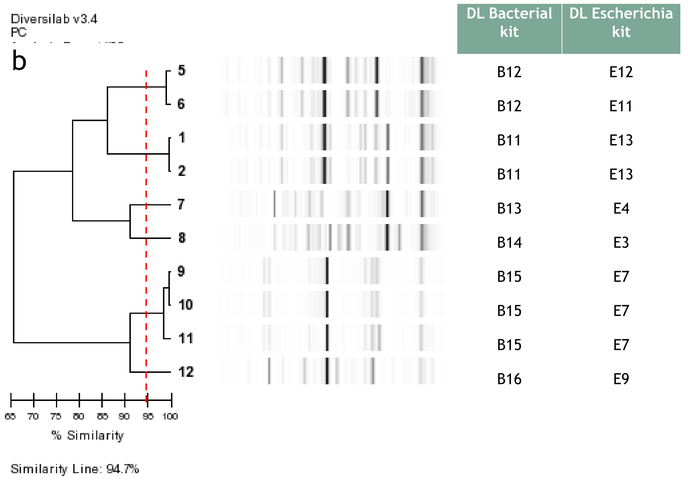
DL Bacterial kit showed low discriminatory power for *K. pneumoniae* strains. Eight of nine peak patterns had a similarity-index of more than 94 percent and no discriminatory peak differences.

CONCLUSIONS

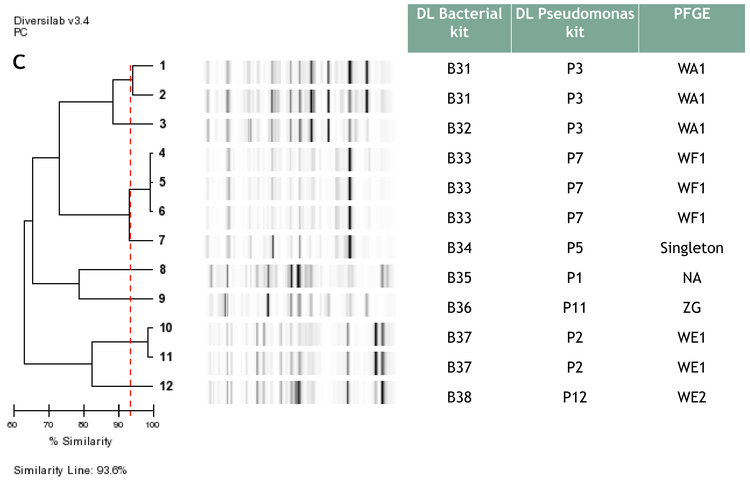
- ✓ DL Bacterial kit is not useful for typing of *Staphylococcus aureus* and *Klebsiella pneumoniae*
- ✓ DL Bacterial kit versus DL species-specific kits gives concordant typing results for *Enterobacter cloacae*, *Escherichia coli* and *Pseudomonas aeruginosa*.
- ✓ DL Bacterial kit can be used as a screening tool for a set of validated genera to exclude outbreaks when species-specific kits are not instantly available.



DL Bacterial kit	DL Enterobacter kit	PFGE
B1	E5	XH2
B1	E5	XH1
B1	E5	XH1
B2	E2	Singleton
B3	E4	Singleton
B3	E3	YY
B3	E3	Singleton
B4	E14	B2
B4	E14	B2
B5	E11	NA
B6	E9	Singleton
B7	E8	Singleton



DL Bacterial kit	DL Escherichia kit
B12	E12
B12	E11
B11	E13
B11	E13
B13	E4
B14	E3
B15	E7
B15	E7
B15	E7
B16	E9



DL Bacterial kit	DL Pseudomonas kit	PFGE
B31	P3	WA1
B31	P3	WA1
B32	P3	WA1
B33	P7	WF1
B33	P7	WF1
B33	P7	WF1
B34	P5	Singleton
B35	P1	NA
B36	P11	ZG
B37	P2	WE1
B37	P2	WE1
B38	P12	WE2

Figure 1: Rep-PCR generated dendrogram and virtual gel image from Diversilab ® (DL) Bacterial kit fingerprints of (a) *Enterobacter cloacae* strains, (b) *Escherichia coli* strains and (c) *Pseudomonas aeruginosa* strains, compared to respectively DL Enterobacter kit, DL Escherichia kit and DL Pseudomonas kit typing and pulsed field gel electrophoresis (PFGE) typing. Random nomenclature was used to assign DL types. (NA: not analyzed; Singleton: type harbored by a single strain)