

# Laboratory Comparison of Etest<sup>®</sup>, MIC Test strip, Vitek<sup>®</sup> 2 systems, and VetMIC<sup>™</sup> microdilution panel for determining the MICs of antibiotics used in the management of Streptococcus pneumoniae infections



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**Introduction:** Antibiotic resistance in Streptococcus pneumoniae is increasing worldwide. In order to compare data and observe resistance trends, it is essential to use standardised protocols. The Clinical and Laboratory Standards Institute (CLSI) recommends the broth dilution method as the reference method for MIC susceptibility testing. The objective of our study was to compare Etest<sup>®</sup>, MIC Test strip, Vitek<sup>®</sup> 2 systems and a microdilution panel to show if these different methods produce the same results.

**Materials:** The clinical specimens containing Streptococcus pneumoniae were processed by the National Reference Centre for Pneumococci in Austria. 100 clinical specimens were included into the study. The used control strain was penicillin intermediate susceptible (Streptococcus pneumoniae (ATCC<sup>®</sup> 49619).

**Etest<sup>®</sup> Strips:** AB BIODISK, Sweden; Chloramphenicol: No. 51000758; Erythromycin: No. 51001058; Benzylpenicillin: No. 51000268; Tetracycline: No. 51002258; Ceftriaxone: No. 51000708; Clarithromycin No. 51000878

**MIC Test Strips:** Liofilchem, Italy; Chloramphenicol: No. 92075; Erythromycin: No. 92051; Penicillin G: No 92103; Tetracycline: No. 92114; Ceftriaxone: No. 92043; Clarithromycin No. 92048

**VITEK<sup>®</sup> 2 Gram positive susceptibility card (AST-GP68):** bioMérieux, France, No. 22231

**VetMIC<sup>™</sup> GP-mo-A panel** for monitoring of resistance in Gram-positive bacteria: SVA, Sweden, No. E 395102

**Methods:** The different methods were performed according to the instructions of the manufacturers. In case of divergent results the CLSI broth dilution method was used as reference method.

**Results:** The results for each antibiotic and method combination were similar. The most homogeneous results in the resistance profile were found between Etest<sup>®</sup> and the MIC Test Strip for all antibiotics (Table 1). The discrepancies in the MIC values were in the range of  $\pm 1$  dilution difference (Table 2). The greatest divergence between all methods was found with Penicillin. The intermediate susceptibility varied from 14% (VITEK<sup>®</sup>) to 20% (MIC Test Strip) of the 100 strains (Table 1). The results of the CLSI broth dilution method confirmed the results of the test strip methods. The VITEK<sup>®</sup> 2 systems method had to be repeated in 16 cases and no result was achieved with 11 strains.

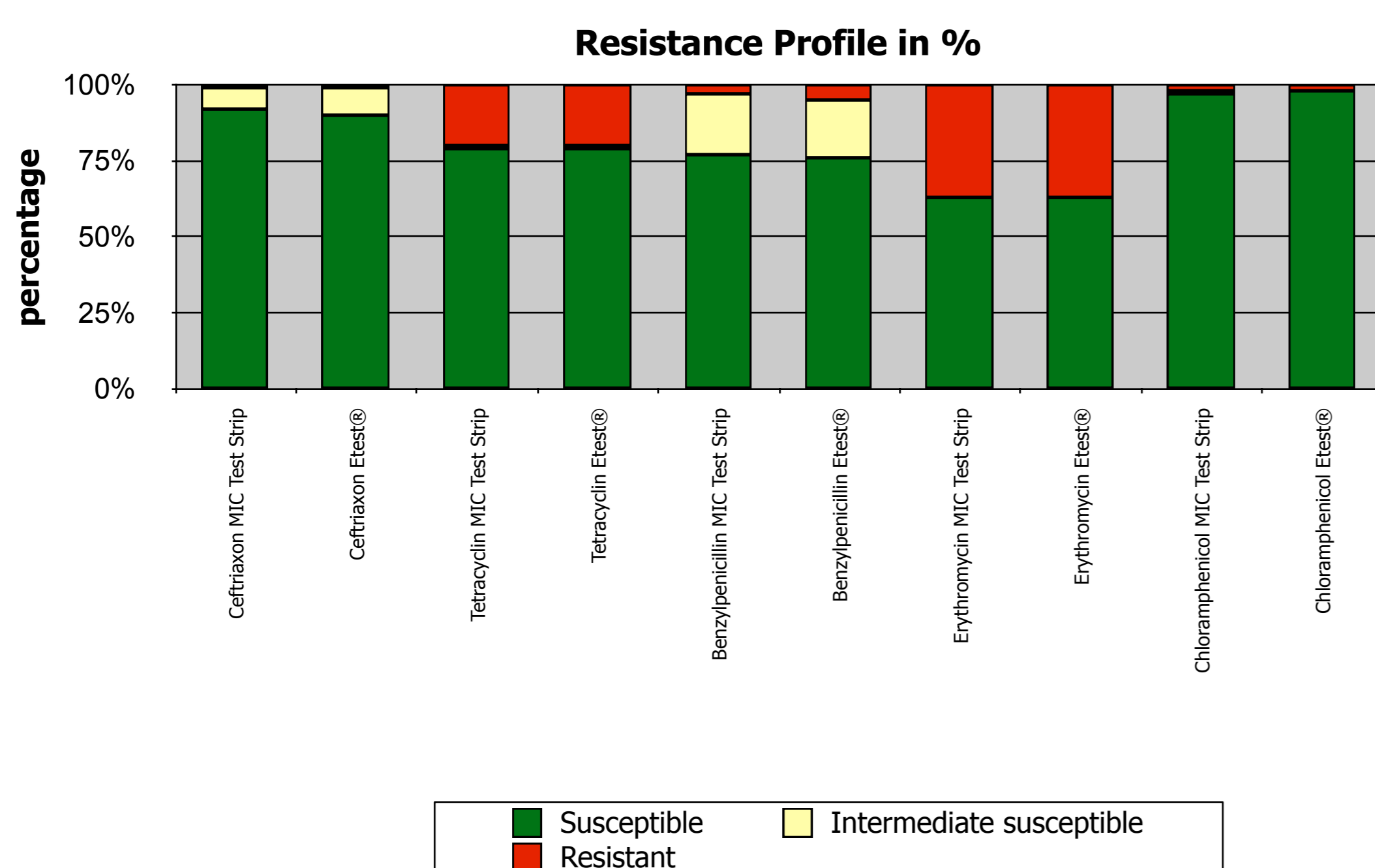


Figure 1: Resistance profile of the strains, tested with Etest<sup>®</sup> and MIC Test Strip

antibiotic	method	specification in %			
		no result	S	I	R
chloramphenicol	Etest <sup>®</sup>	/	98	/	2
	MIC T strip	/	97	1	2
	Vitek <sup>®</sup>	5	94	/	1
	VetMIC <sup>™</sup>	/	90	/	10
erythromycin	Etest <sup>®</sup>	/	63	/	37
	MIC T strip	/	63	/	37
	Vitek <sup>®</sup>	6	59	/	35
	VetMIC <sup>™</sup>	/	62	1	37
penicillin	Etest <sup>®</sup>	/	76	19	5
	MIC T strip	/	77	20	3
	Vitek <sup>®</sup>	/	77	14	9
	VetMIC <sup>™</sup>	/	77	16	7
tetracycline	Etest <sup>®</sup>	/	79	1	20
	MIC T strip	/	79	1	20
	Vitek <sup>®</sup>	1	78	1	20
	VetMIC <sup>™</sup>	/	79	/	21

Table 1: Result overview: classified according to CLSI breakpoints in percentages (S sensitive, I intermediate, R resistant)

Drug	Agreement (%)		
	same result	$\pm 0,5$ dilution steps	$\pm 1$ dilution steps
chloramphenicol	4	68	28
erythromycin	70	30	/
benzylpenicillin	63	37	/
tetracycline	60	40	/
ceftriaxone	72	28	/
clarithromycin	60	39	1

Table 2: Agreement Etest<sup>®</sup> and MIC Test Strip

**Conclusions:** Etest<sup>®</sup> and MIC Test Strip are useful for pneumococci MIC determination in the clinical diagnostic laboratory. Pneumococci susceptibility testing with VITEK<sup>®</sup> 2 Systems seems to be not matured yet, testing with VetMIC<sup>™</sup> microdilution imposed a high workload. There is no significant difference between the results of susceptibility testing by Etest<sup>®</sup> and MIC Test Strip.



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