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In Vitro Activity of Aztreonam-avibactam Against Ceftazidime-avibactam-resistant Enterobacterales Isolates Collected from Patients in the Asia/Pacific Region, ATLAS Surveillance Study, 2020-2024

H. Li[1], M. Estabrook[1], G. Stone[2], K. Perez[2]
[1]IHMA, Inc., Schaumburg, IL, USA
[2]Pfizer Inc., Groton, CT, USA

IHMA
2122 Palmer Dr.
Schaumburg, IL 60173
Tel: +1.847.303.5003
Fax: +1.847.303.5601
www.ihma.com

Introduction

Aztreonam (ATM) is a monobactam stable against hydrolysis by metallo-β-lactamases (MBLs), and avibactam (AVI) inhibits class A, class C, and some class D serine β-lactamases. The combination of aztreonam-avibactam shows high *in vitro* activity against drug-resistant isolates of Enterobacterales, especially those harboring MBLs. This study evaluated the *in vitro* activity of aztreonam-avibactam and comparators against ceftazidime-avibactam-resistant (CZA-R) Enterobacterales collected in 2020-2024 from patients in the Asia/Pacific region as part of the ATLAS global surveillance program [1].

Materials & Methods

- 26,310 isolates from patients were collected from 66 medical centers and 11 countries in the Asia/Pacific region [2-3]. Sites submitted a pre-defined number of each species of isolates, per protocol.
- Antimicrobial susceptibility was performed by broth microdilution according CLSI methods and interpreted using CLSI 2026 breakpoints. Cefiderocol was only tested on isolates collected in 2024 (n=4639).

Results Summary

- Among the entire Asia/Pacific region, 98.8% of isolates collected were susceptible to ATM-AVI, the most of all comparators tested (Table 1). ATM-AVI was the most active agent in all phenotypic groups compared to all comparators tested (85.1% to 96.5% susceptible [S]). Among MEM-NS, AMK-NS, FEP-NS, and FDC-R isolates, 93.7%, 96.1%, 96.5%, and 85.1% were susceptible to ATM-AVI, respectively.
- Among all collected isolates, 2,108 were CZA-R and more were susceptible to ATM-AVI compared with all comparators, including cefiderocol (89.9% vs 86.2%-S) (Table 2). ATM-AVI was least active against CZA-R isolates from India and China (87.2%-S and 91.1%-S, respectively).
- Isolates collected in India displayed the lowest susceptibility to ATM-AVI of all countries and in all phenotypic groups (87.2% to 93.5%-S) (Figure 2). CZA-R and FDC-R isolates collected in China displayed lower susceptibility to ATM-AVI compared to other phenotypic groups (91.1% and 93.8%-S, respectively). Isolates from all other countries and phenotypic groups were 97%-100% susceptible to ATM-AVI.

Conclusion

These data support ATM-AVI as an important therapeutic option for serious infections caused by CZA-R Enterobacterales across the APAC region.

References

1. Pfizer. *ATLAS (Antimicrobial Testing Leadership and Surveillance).* https://atlas-surveillance.com [Registration required]. Accessed 01May2026.
2. Clinical and Laboratory Standards Institute (CLSI), 2024. *Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically*, 12th ed. CLSI Standard M07. Wayne, Pennsylvania 19087-1898 USA.
3. Clinical and Laboratory Standards Institute (CLSI), 2026. *Performance Standards for Antimicrobial Susceptibility Testing.* 36th Ed. CLSI Supplement M100. Wayne, Pennsylvania 19087-1898 USA.

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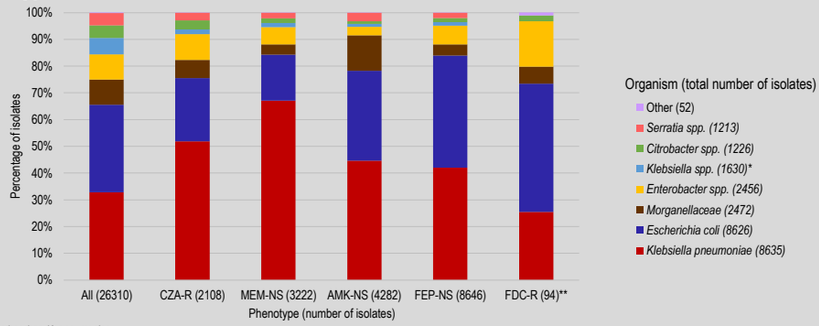
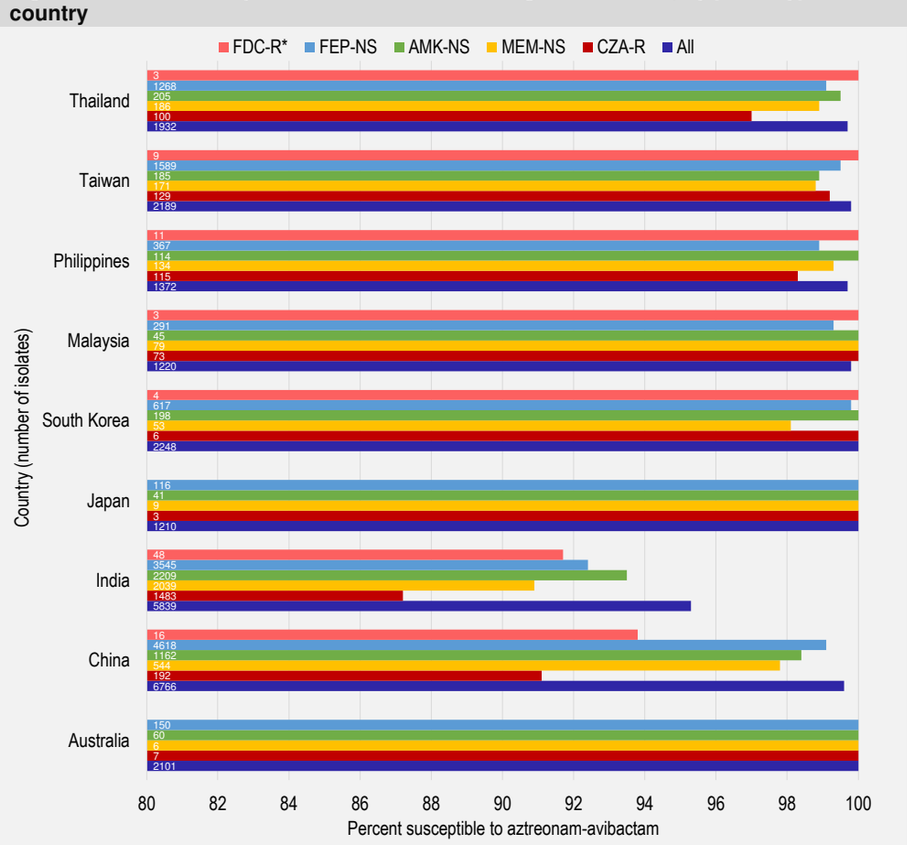
Results

Figure 1. Taxonomic grouping of Enterobacterales isolates collected in this study by phenotype



*Species other than *K. pneumoniae*

Figure 2. *In vitro* activity of aztreonam-avibactam against isolates, by phenotype and country



Abbreviations: FDC-R, cefiderocol resistant; FEP-NS, cefepime non-susceptible; AMK-NS, amikacin non-susceptible; MEM-NS, meropenem non-susceptible; CZA-R ceftazidime-avibactam resistant.
No isolates collected in Australia and Japan were FDC-R. Hong Kong and New Zealand were excluded due to low number of isolates displaying non-susceptible/resistant phenotypes.
*Cefiderocol was tested only on isolates collected in 2024 (n=4639).

Table 1. *In vitro* activity of aztreonam-avibactam and comparator agents against isolates, by phenotype

Phenotype	N	Agent [MIC_{90} (µg/mL), percentage susceptible[a]]																	
		ATM-AVI		ATM		FDC[b]		CZA		FEP		MEM		AMK		LVX		CST	
		MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%I[c]
All	26310	0.25	**98.8**	>64	65.2	2	**98.0**	2	**92.0**	>32	67.1	16	87.8	16	83.7	>8	57.6	>8	83.3
CZA-R	2108	8	89.9	>64	13.0	8	86.2	>64	0.0	>32	0.4	>16	4.2	>64	30.6	>8	5.1	>8	85.4
MEM-NS	3222	4	**93.7**	>64	9.1	8	89.7	>64	37.3	>32	0.7	>16	0.0	>64	30.6	>8	4.2	8	87.2
AMK-NS	4282	1	**96.1**	>64	25.2	4	**93.7**	>64	65.9	>32	21.3	>16	47.9	>64	0	>8	13.4	>8	78.7
FEP-NS	8646	1	**96.5**	>64	8.8	4	**94.3**	>64	75.7	>32	0.0	>16	63.1	>64	61.1	>8	15.7	2	**90.3**
FDC-R[b]	94	8	85.1	>64	4.3	>32	0.0	>64	29.8	>32	1.1	>16	20.2	>64	47.9	>8	2.1	>8	81.9

Abbreviations: ATM-AVI, aztreonam-avibactam; ATM, aztreonam; FDC, cefiderocol; CZA, ceftazidime-avibactam; FEP, cefepime; MEM, meropenem; AMK, amikacin; LVX, levofloxacin; CST, colistin; CZA-R, ceftazidime-avibactam resistant; MEM-NS, meropenem non-susceptible; AMK-NS, amikacin non-susceptible; FEP-NS, cefepime non-susceptible; FDC-R, cefiderocol resistant.
[a] Percent susceptible using 2026 CLSI breakpoints.
[b] Cefiderocol was tested on only a subset of 4,639 isolates collected in 2024. No isolates from Hong Kong were tested with cefiderocol.
[c] Intermediate breakpoint used for colistin.

Table 2. *In vitro* activity of aztreonam-avibactam and comparator agents against ceftazidime-avibactam-resistant isolates, by country

Country	N	Agent [MIC_{90} (µg/mL), percentage susceptible[a]]																	
		ATM-AVI		ATM		FDC[b]		FEP		MEM		AMK		LVX		CST			
		MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%S	MIC_{90}	%I[c]		
All CZA-R	2108	8	89.9	>64	13.0	8	86.2	>32	0.4	>16	4.2	>64	30.6	>8	5.1	>8	85.4		
Australia	7	N/A	**7 of 7**	N/A	42.9	N/A	**7 of 7**	N/A	28.6	N/A	5 of 7	N/A	6 of 7	N/A	3 of 7	N/A	6 of 7		
China	192	4	**91.1**	>64	29.2	8	89.6	>32	1.6	>16	4.7	>64	65.6	>8	12.5	>8	85.9		
India	1483	8	87.2	>64	7.7	8	86.0	>32	0.3	>16	2.0	>64	15.7	>8	2.0	>8	86.9		
Japan	3	N/A	**3 of 3**	N/A	33.3	N/A	**3 of 3**	N/A	0 of 3	N/A	1 of 3	N/A	**3 of 3**	N/A	66.7	N/A	**3 of 3**		
South Korea	6	N/A	**6 of 6**	N/A	33.3	N/A	**6 of 6**	N/A	0 of 6	N/A	1 of 6	N/A	4 of 6	N/A	16.7	N/A	4 of 6		
Malaysia	73	1	**100**	>64	15.1	8	89.7	>32	0.0	>16	1.4	>64	75.3	>8	27.4	0.25	**91.8**		
Philippines	115	0.5	**98.3**	>64	27.0	16	77.1	>32	0.0	>16	2.6	>64	62.6	>8	11.3	4	89.6		
Taiwan	129	1	**99.2**	>64	33.3	8	89.2	>32	0.0	>16	28.7	>64	71.3	>8	9.3	>8	65.9		
Thailand	100	1	**97.0**	>64	12.0	32	**90.0**	>32	0.0	>16	2.0	>64	55.0	>8	2.0	>8	80.0		

Abbreviations: ATM-AVI, aztreonam-avibactam; ATM, aztreonam; FDC, cefiderocol; FEP, cefepime; MEM, meropenem; AMK, amikacin; LVX, levofloxacin; CST, colistin; CZA-R, ceftazidime-avibactam resistant.
[a] Percent susceptible using 2026 CLSI breakpoints.
[b] Cefiderocol was tested on only a subset of 4,639 isolates collected in 2023 and 2024. No isolates from Hong Kong were tested with cefiderocol.
[c] Intermediate breakpoint used for colistin.
MIC_{90} was only calculated for countries with >10 isolates. Hong Kong and New Zealand had no isolates resistant to ceftazidime-avibactam.

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