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In vitro antibacterial activity of tigecycline against 434 multidrug resistant pathogens in Germany and a central European area, 2010

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Introduction and Purpose

The emergence and dissemination of multidrug-resistant (MDR) Gram-negative and Gram-positive pathogens, like extended-spectrum β-lactamase (ESBL) producing Enterobacteriaceae, carbapenem-resistant *Acinetobacter* spp., *Stenotrophomonas maltophilia*, methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE) have compromised the use of standard antibiotics in many parts of the world. Tigecycline, a glycylcycline antibiotic, has been shown to be active against a wide range of Gram-positive and Gram-negative bacteria, including MDR strains [1–3]. In Germany, it has been available for clinical use since 2006.

The aim of the present study was to evaluate the in vitro activity of tigecycline against MDR strains recovered during a multicentre resistance surveillance study conducted by the Paul Ehrlich Society of Chemotherapy between October and December 2010.

Methods

Bacterial organisms

Of 5,802 non-duplicate clinical isolates collected from 25 laboratories located in Germany (n=21), Switzerland (n=3), and Austria (n=1), 434 MDR isolates were selected for the present study: carbapenem-non-susceptible (CARB-NS) isolates of the *A. baumannii*-group (n=21, 19 and 2 of which were CARB-NS *A. baumannii* and CARB-NS *A. pittii*, respectively), *Stenotrophomonas maltophilia* (n=100), Enterobacteriaceae showing the ESBL phenotype (n=175, including *Escherichia coli* [n=109], *Klebsiella oxytoca* [n=16], *K. pneumoniae* [n=47], and *Proteus mirabilis* [n=3]), MRSA (n=100) and VR*E. faecium* (n=38).

Susceptibility testing

Susceptibility testing was performed in a central laboratory (Antiinfectives Intelligence). MICs were determined using the microdilution method according to the standard ISO 20776-1 [4] and interpreted by EUCAST criteria [5], if available.

Results

The majority of MDR isolates (n=257, 59.2%) were recovered from male patients. Patients ranged in age from <1 to 97 years (median 67 years), whereas the majority of isolates (n=220, 50.7%) derived from the 60-79 years old (**Figure 1**). Two hundred and fifty-five (58.8%) isolates were obtained from patients on general wards, 140 (32.3%) from ICU-patients and 38 (8.8%) from outpatients (**Figure 2**). The source of one strain was unknown. The majority of pathogens derived from specimens of the respiratory tract (n=123, 28.3%), followed by wound specimens (n=93, 21.4%).

MIC distributions of tigecycline, MIC_{50} and MIC_{90} values as well as the rates of susceptible, intermediate and resistant isolates obtained for the test organisms are shown in the **Table**. MIC values of tigecycline for isolates of the CARB-NS *A. baumannii*-group and *S. maltophilia* ranged from 0.25 mg/L to 4 mg/L ($MIC_{50/90}$, 1/4 mg/L) and from 0.063 mg/L to 8 mg/L ($MIC_{50/90}$ 0.5/2 mg/L), respectively. ESBL-producing strains of *P. mirabilis* were resistant to tigecycline, as expected, while all but three ESBL-producing isolates of *K. pneumoniae* and all isolates of *E. coli, K. oxytoca*, MRSA and VR*E. faecium* were tigecycline-susceptible.

Conclusions

- **Four years after its introduction into the German market, tigecycline demonstrated favorable in vitro activity against MDR-isolates from the central European area.**
- **Consequently, tigecycline remains a valid treatment option for infections in which MDR pathogens are involved.**

Table: Susceptibility of 434 multidrug-resistant pathogens to tigecycline

Isolates (no. tested)	MIC (mg/L)												MIC_{50} (mg/L)	MIC_{90} (mg/L)	%S	%I	%R
	≤0.016	0.031	0.063	0.125	0.25	0.5	1	2	4	8	16	≥32					
Acinetobacter-baumannii-group CARB-NS (21)					1	6	5	3	6				1	4	–	–	–
Acinetobacter baumannii CARB-NS (19)						6	5	2	6				1	4	–	–	–
Acinetobacter pittii CARB-NS (2)					1			1					–	–	–	–	–
Stenotrophomonas maltophilia (100)			1	4	19	35	20	12	8	1			0.5	2	–	–	–
Escherichia coli ESBL phenotype (109)				36	50	22	1						0.25	0.5	100.0	0	0
Klebsiella oxytoca ESBL phenotype (16)					7	6	3						0.5	1	100.0	0	0
Klebsiella pneumoniae ESBL phenotype (47)					3	24	17	3					0.5	1	93.6	6.4	0
Proteus mirabilis ESBL phenotype (3)								1	1	1			–	–	–	–	–
Staphylococcus aureus MR (100)			16	71	12	1							0.125	0.25	100.0	–	0
Enterococcus faecium VR (38)		1	27	10									0.063	0.125	100.0	0	0

Abbreviations: %-S, % susceptible; %-I, % intermediate; %-R, % resistant; CARB-NS, non-susceptible to imipenem and/or meropenem; MR, methicillin-resistant; VR, vancomycin-resistant

Figure 1: Distribution of isolates by patients' age (in years)

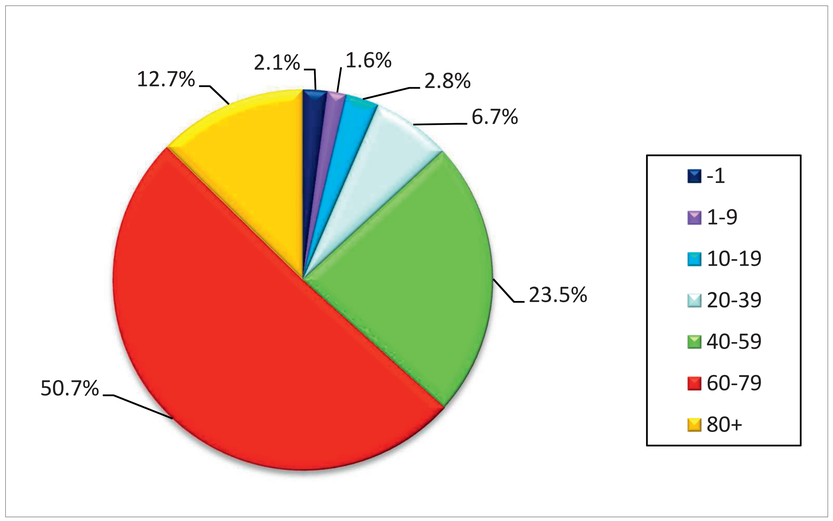
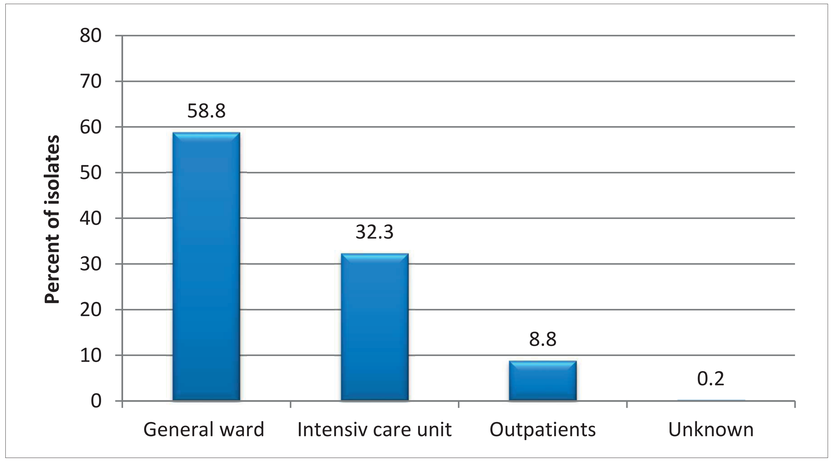


Figure 2: Distribution of isolates by type of ward



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