Comparative evaluation of a new commercial colorimetric microdilution assay (SensiQuattro *Candida* EU) with Etest and EUCAST broth microdilution for susceptibility testing of invasive *Candida* isolates

Köhling H. L.[1], Willinger B.[2], Buer J.[1], Rath P.-M.[1], Steinmann J.[1]

[1]Institute of Medical Microbiology, University Hospital Essen, University of Duisburg-Essen, Essen, Germany

[2]Department of Clinical Microbiology, Institute of Hygiene and Medical Microbiology, Medical University of Vienna, Vienna, Austria

Introduction

The aim of this study was to assess the performance of the SensiQuattro assay (SQ, Liofilchem, Italy), a novel commercially available colorimetric broth microdilution (BMD) panel, for susceptibility testing of invasive *Candida* isolates against the antimycotic drugs fluconazole (FLU), posaconazole (POS), voriconazole (VOR) and amphotericin B (AMB).

Materials and Methods

The minimum inhibitory concentrations (MICs) obtained by SQ of a total of 187 well characterized blood culture isolates of *Candida* spp. (120 *C. albicans*, 38 *C. glabrata*, 10 *C.parapsilosis*, 12 *C. tropicalis* and 7 *C. krusei*) collected in two University Hospitals (Essen, Germany and Vienna, Austria) were compared with BMD and Etest (bioMérieux, France) by using EUCAST recommendations. Reference BMD, Etest and SQ MICs were established after 24 h of incubation. Both, SQ and Etest were performed according to the manufacturer´s instructions. Categorical agreement (CA) was based on interpretive breakpoints of susceptible, intermediate, and resistant. In the case of absence of clinical breakpoints for EUCAST or CLSI CBPs were adopted from Pfaller et al.

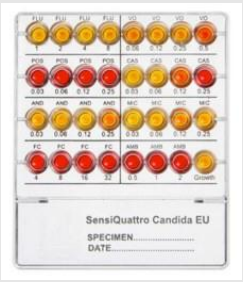

Figure 1: Liofilchem® Broth Microdilution panel

Conclusions

With the two exceptions of *C. glabrata* testing for VOR susceptibility and *C. krusei* testing for AMB susceptibility the SQ colorimetric BMD panel appears to be a suitable alternative procedure for routine antifungal susceptibility testing of *Candida* spp. against azoles and AMB. Within the five *Candida* species investigated, SQ performed best for *C. albicans.* On average, posaconazole and fluconazole showed the highest percentage of SQ-CA for all tested organisms. Most of the VME (very major error) occurred in testing *C. krusei* for AMB.

References

Pfaller MA, Boyken L, Hollis RJ, Kroeger J, Messer SA, Tendolkar S, Diekema DJ. 2011. Wild-type MIC distributions and epidemiological cutoff values for posaconazole and voriconazole and *Candida spp*. as determined by 24-hour CLSI broth microdilution. J. Clin. Microbiol. **49**:630-637.

Results

Table 1. In vitro susceptibilities of 187 isolates of *Candida* spp. to amphotericin B, fluconazole, posaconazole and voriconazole as determined by SensiQuattro, EUCAST BMD and Etest. [a]

Species (no of isolates tested)	Antifungal agent	Test method	MIC (µg/ml)			EA (%)	CA (%)	% Errors		
			Range	50%	90%			VME	ME	Minor
C.albicans (120)	Amphotericin B	SensiQuattro	<0.5->2	0.5	1.7	100	97.4	1.7	0.9	0
	Amphotericin B	BMD	0.25-2	1	1					
	Amphotericin B	Etest	0.125-0.75	0.38	0.5	81.67	98.3	1.7	0	0
	Fluconazole	SensiQuattro	<1->8	1	1	45.7	94	3.4	2.6	0
	Fluconazole	BMD	0.12->64	0.185	0.275					
	Fluconazole	Etest	0.064->256	0.38	1	86.67	91.7	3.3	2.5	2.5
	Posaconazole	SensiQuattro	<0.03->0.25	0.14	0.228	94.83	93.2	3.4	3.4	0
	Posaconazole	BMD	0.016->8	0.06	0.06					
	Posaconazole	Etest	0.016-3	0.047	0.064	95.8	91.7	3.3	5	0
	Voriconazole	SensiQuattro	<0.06->0.5	0.5	0.5	93.67	94.8	2.6	2.6	0
	Voriconazole	BMD	0.016->8	0.016	0.016					
	Voriconazole	Etest	0.004-0.125	0.012	0.032	96.67	97.5	2.5	0	0
C. glabrata (38)	Amphotericin B	SensiQuattro	<0.5-2	2	2	100	84.2	7.9	7.9	0
	Amphotericin B	BMD	0.25-2	1	2					
	Amphotericin B	Etest	0.19-1	0.5	0.75	94.5	86.80	13.2	0	0
	Fluconazole	SensiQuattro	<1->8	8	8	65.8	*	*	*	*
	Fluconazole	BMD	0.5->64	4	64					
	Fluconazole	Etest	2-256	7	256	97.4	97.40	0	0	2.6
	Posaconazole	SensiQuattro	>0.25	0.25	0.25	90	*	*	*	*
	Posaconazole	BMD	0.12->8	1	2.4					
	Posaconazole	Etest	0.125-12	0.5	2	92	92.10	0	7.9	0
	Voriconazole	SensiQuattro	0.06->0.5	0.5	0.5	60.5	28.4	0	81.6	0
	Voriconazole	BMD	0.016-4	0.25	4					
	Voriconazole	Etest	0.032-32	0.125	2.6	89.5	94.70	0	5.3	0
C. parapsilosis (10)	Amphotericin B	SensiQuattro	0.5	0.5	0.5	100	90	10	0	0
	Amphotericin B	BMD	0.5-2	1	1.1					
	Amphotericin B	Etest	0.094-0.5	0.25	0.392	60	90	10	0	0
	Fluconazole	SensiQuattro	1	1	1	100	100	0	0	0
	Fluconazole	BMD	0.25-4	0.5	2.2					
	Fluconazole	Etest	0.5-4	0.625	4	90	100	0	0	0
	Posaconazole	SensiQuattro	<0.03	0.03	0.03	90	90	10	0	0
	Posaconazole	BMD	0.03-0.12	0.06	0.066					
	Posaconazole	Etest	0.023-0.25	0.079	0.1096	100	80	0	20	0
	Voriconazole	SensiQuattro	<0.06	0.06	0.06	100	90	10	0	0
	Voriconazole	BMD	0.016-0.25	0.016	0.052					
	Voriconazole	Etest	0.004-0.19	0.0195	0.19	80	70	10	20	0
C. tropicalis (12)	Amphotericin B	SensiQuattro	0.5	0.5	0.5	100	100	0	0	0
	Amphotericin B	BMD	0.5-1	1	1					
	Amphotericin B	Etest	0.19-0.75	0.25	0.5	83.3	100	0	0	0
	Fluconazole	SensiQuattro	<1->8	1.5	8	50	58.3	0	41.7	0
	Fluconazole	BMD	0.12-4	0.375	0.5					
	Fluconazole	Etest	0.25-4	0.38	0.75	100	100	0	0	0
	Posaconazole	SensiQuattro	<0.03-0.25	0.03	0.039	66.7	67.7	0	33.3	0
	Posaconazole	BMD	0.016-0.25	0.06	0.06					
	Posaconazole	Etest	0.008-0.125	0.064	0.094	100	67.7	0	33.3	0
	Voriconazole	SensiQuattro	<0.06->0.5	0.06	0.078	66.7	67.7	0	33.3	0
	Voriconazole	BMD	0.016-0.03	0.023	0.03					
	Voriconazole	Etest	0.012-0.047	0.0275	0.047	100	67.7	0	33.3	0
C. krusei (7)	Amphotericin B	SensiQuattro	0.5	0.5	0.5	100	28.6	71.4	0	0
	Amphotericin B	BMD	1,0-2	2	2					
	Amphotericin B	Etest	0.125-2	0.875	1.55	100	42.9	57.1	0	0
	Fluconazole	SensiQuattro	<1->8	8	8	85.7	*	*	*	*
	Fluconazole	BMD	16->64	32	64					
	Fluconazole	Etest	16->256	32	83.2	100	100	0	0	0
	Posaconazole	SensiQuattro	0.03	0.03	0.03	28.6	100	0	0	0
	Posaconazole	BMD	0.03-1	0.25	0.55					
	Posaconazole	Etest	0.19-0.75	0.25	0.525	100	100	0	0	0
	Voriconazole	SensiQuattro	<0.06-0.25	0.06	0.098	57.1	71.4	28.6	0	0
	Voriconazole	BMD	0.25-2	0.25	2					
	Voriconazole	Etest	0.038-3	0.19	1.2	85.7	85.7	14.3	0	0

* non-determinable. Measurements of MIC cannot differentiate between susceptible, intermediate or resistant.

[a] Abbreviations: EA, essential agreement = (±2 $\log_2$ dilutions) between SensiQuattro, BMD and Etest. CA, categorical agreement; VME, very major error; ME, major error; minor , minor error;