

# Candidaemia in Bulgaria: an open follow-up multicentre survey

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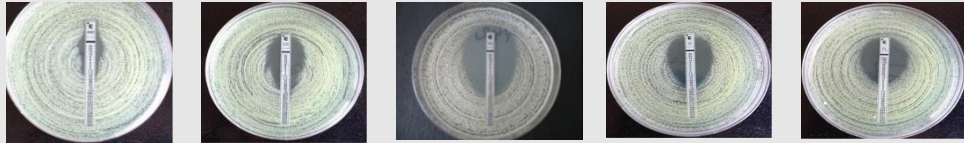
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## Objectives

In the beginning, the aim of this study was to evaluate for a 6-year period (2008-2013) the Candida blood culture isolates distribution and antifungal susceptibility in selected Bulgarian hospitals. Now we are expanding the number of participating hospitals and include new antifungal agents.

## Materials and Methods

A total of 745 Candida yeast isolates, including 337 *C. albicans*, 185 *C. parapsilosis*, 102 *C. glabrata*, 49 *C. tropicalis*, 32 *C. krusei* and other Candida non-albicans strains identified by API 20 AUX and VITEK 2 automated system (BioMerieux, France) were tested. The isolates were recovered from blood culture in hospitalized patients (in ICU- intensive care units, organ transplantation, hematology, neonatology, with trauma, surgery or other disease).



1) Anidulafungin 2) Caspofungin 3) Voriconazole 4) Itraconazole 5) Fluconazole

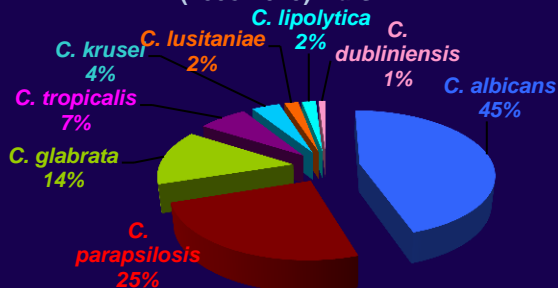
### Zones of inhibition with E-test strips

Minimal inhibitory concentrations (MICs) were determined by E-test agar diffusion method with the use of E-test strips (AB Biodisk) which were applied to Muller-Hinton agar plates after 24 and 48 h incubation at 35°C for anidulafungin, caspofungin, voriconazole, itraconazole and fluconazole. Our study is a part of Bulgarian surveillance programme (BuSTAR), which monitors the etiology of infections and the susceptibility to antimicrobial agents in Bulgaria.

## Results

The most frequently isolated species was Candida albicans (45%), followed by C. parapsilosis (25%), C. glabrata (14%), C. tropicalis (7%), C. krusei (4%), and other Candida non-albicans strains (5%). Low susceptibility to fluconazole was detected among C. albicans (3%, MIC>256 mg l<sup>-1</sup>), C. glabrata (29%, MIC16-32 mg l<sup>-1</sup>; 27% MIC>64 mg l<sup>-1</sup>), C. krusei (28%, MIC32-64 mg l<sup>-1</sup>; 72%, MIC>256 mg l<sup>-1</sup>). No resistance to fluconazole, itraconazole and voriconazole was detected in C. parapsilosis and C. tropicalis.

### Etiological structure of Candida bloodstream isolates (2008-1013)-BuSTAR



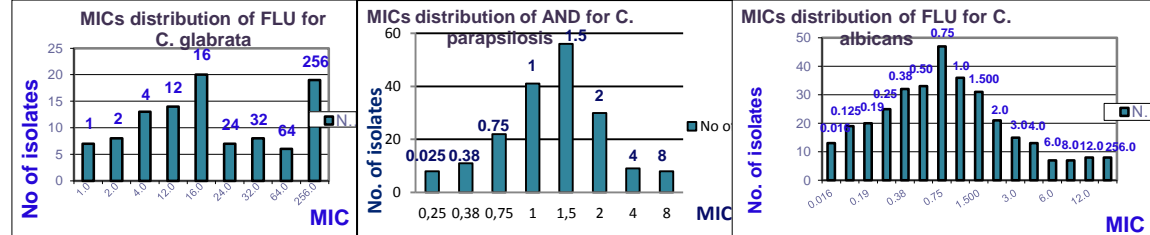
This chart shows the species distribution.

Resistance to voriconazole was detected only in C. glabrata and C. krusei. Higher MICs were determined for anidulafungin and caspofungin against C. parapsilosis.

Table 1: MIC90 and range of MICs (mg/l) of fluconazole, itraconazole, voriconazole, anidulafungin and caspofungin determined by E-test.

Species (number of isolates tested)	Anidulafungin	Caspofungin	Voriconazole	Fluconazole	Itraconazole
	Range of MICs/ MIC <sub>90</sub> (mg/l)	Range of MICs/ MIC <sub>90</sub> (mg/l)	Range of MICs/ MIC <sub>90</sub> (mg/l)	Range of MICs/ MIC <sub>90</sub> (mg/l)	Range of MICs/ MIC <sub>90</sub> (mg/l)
<i>C. albicans</i> (337)	<0.002-0.032/0.016	<0.002-0.064/0.047	0.008-0.064/0.047	0.016->256/8	0.012-32/6
<i>C. parapsilosis</i> (185)	0.25-8/2	0.125-0.75/0.5	0.023-0.25/0.125	0.38-12.0/4	0.19-6/2
<i>C. glabrata</i> (102)	<0.002-0.5/0.25	<0.002-0.5/0.25	0.25-32/16	1->256/>64	1-32/16
<i>C. tropicalis</i> (49)	<0.002-0.125/0.064	0.012-0.5/0.125	0.032-0.094/0.064	0.38-16/8	0.38-6/1
<i>C. krusei</i> (32)	0.006-0.25/0.125	0.016-0.25/0.125	0.064-4/1	24->256/>256	2-32/16
<i>C. lusitanae</i> (15)	0.06-0.5/0.25	0.06-0.75/0.25	0.006-0.016/0.012	0.5-16/1	0.064-1/0.5
<i>C. lipolytica</i> (14)	0.008-0.25/0.125	0.016-0.25/0.125	0.025-4/1	16-64/32	2-32/16
<i>C. dubliniensis</i> (7)	0.008-0.032/0.016	0.008-0.064/0.047	0.016-0.064/0.047	0.016-6/0.75	0.016-2/0.75

MIC-minimal inhibitory concentration; MIC90-minimum inhibitory concentration required to inhibit the growth of 90% of organisms;



## Conclusions

The data from BuSTAR showed that for the period of 2008 to 2013 Candida strains are on the fifth place from all bloodstream isolates and showed an increase from 1.7% to 5.2%. This study confirmed the high percentage of isolated C. non-albicans strains, especially C. parapsilosis. An important concern is the low fluconazole susceptibility detected in C. glabrata and C. krusei. Anidulafungin and caspofungin showed good activity against C. glabrata and C. krusei which were resistant to fluconazole, itraconazole and voriconazole. Our study reveals no evidence of emerging voriconazole or anidulafungin resistance among C. albicans, and most of the other frequently isolated species. Low MICs for anidulafungin were observed with C. albicans and all of the Candida non-albicans (range of MICs from <0.002 to 0.75 mg/l), whereas the MICs were higher for C. parapsilosis (for AND range of MICs from 0.25 to 8 mg/l), and for caspofungin from 0.125 to 0.75 mg/l). E-test proved to be rapid (24 hour), easy to perform and reliably determines the antifungal susceptibility to azoles and echinocandins of invasive yeast isolates.

## References

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