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Nicole M. Holliday
Thermo Fisher Scientific
982 Keynote Circle, Suite 6
Cleveland, Ohio 44131
Phone: 1-800-871-8909
Email: nholliday@thermofisher.com

Rapid Identification and MIC Susceptibility of *Candida* Species Utilizing *Brilliance* Candida, RapID Yeast Plus System and Sensititre YeastOne Panels

* N. M. Holliday[1], C. C. Knapp[1], S.B.Killian[1], C.Bastulli[1], A.Appleton[2]
[1]TREK Diagnostic Systems, Cleveland, OH; [2]Thermo Fisher Scientific, Basingstoke, UK

Abstract

Background: With the increasing rate of fungal infections each year, rapid identification, and MIC confirmation is important to initiate effective therapies. An evaluation was undertaken to determine identification agreements between the *Brilliance*™ Candida (BC) (Thermo Fisher Scientific, Basingstoke, UK) and the RapID™ Yeast Plus System (RapID) (Thermo Fisher Scientific, Lenexa, Kansas) as well as the Sensititre™ YeastOne™ (YO) (TREK Diagnostic Systems, part of Thermo Fisher Scientific, Cleveland, OH) susceptibility system. The BC agar is a selective and differential medium for the rapid identification of *Candida* spp. The RapID is a qualitative identification for the rapid identification of *Candida* spp. Sensititre YeastOne susceptibility system is designed for use in determining quantitative antifungal susceptibilities (MICs). Isolates were taken directly from the BC agar and compared to isolates taken from Sabouraud Dextrose Agar (SAB) for a more rapid identification and MIC. **Methods:** 100 isolates including 38 *C. albicans*, 16 *C. tropicalis*, 24 C. *glabrata*, 10 C. *parapsilosis*, 5 C. *lusitaniae*, and 7 C. *krusei*, were inoculated onto a BC agar and SAB. Both agars were incubated at 35^{0}C for 24 hours. After incubation the Sensititre YO inoculum was prepared from colonies grown on both the BC agar and SAB. The RapID identification was compared to the BC agar. All isolates were tested on the Sensititre YO consisting of 9 antifungals: Micafungin, Caspofungin, 5-Flucytosine, Posaconazole, Voriconazole, Itraconazole, Fluconazole, Anidulafungin, and Amphotericin B. Tests were read as per the manufacturer's instructions. Recommended quality control (QC) organisms were tested daily and all ID and MIC results were as expected.
Results: Comparison of the BC to the RapID resulted in 100% agreement utilizing both identification methods for all *Candida* species. MIC comparison of the BC to the SAB using the Sensititre YO resulted in 100% essential (+/- 2 $\log_2$ dilutions) and 100% categorical agreement (using CLSI clinical MIC breakpoints).
Conclusion: The use of BC or RapID and the Sensititre YO provides a faster and reliable method in clinical labs for performing identification and susceptibility tests of *Candida* spp.

Introduction

Candida species are the fourth most commonly encountered nosocomial pathogens in bloodstream infections in the United States, and candidiasis is associated with mortality rates as high as 60% in immuno-suppressed patients. Of the *Candida* spp. encountered in clinical practice, *Candida albicans* is the most common, however, there is a shift toward the isolation of more azole-tolerant species, such as *Candida glabrata, Candida tropicalis,* and *Candida krusei,* which is causing great concern. The need for rapid identification of *Candida* spp. is critical for the clinician to determine the appropriate antifungal therapy. Rapid identification of *Candida* spp. will therefore have a direct impact on the morbidity, mortality, and duration of hospitalization.

Objective

This study was undertaken to determine if the Sensititre YeastOne susceptibility testing panel** (Figure 1) could be used with the Oxoid *Brilliance* Candida Agar* (Figure 2) or with the Thermo Scientific RapID System (Figure 3) for rapid identification in 4 hours and confirmation of the Minimum Inhibitory Concentration (MIC) of *Candida* species.

*Not available in the U.S.
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Figure 1.

Figure 2.

C. albicans/C.dubliniensis Green	*C.tropicalis* Blue
C.krusei Brown/Pink	*C.glabrata/C.kefyr C.parapsilosis/C.lusitaniae* Variable, natural pigment

Figure 3.

Materials & Methods

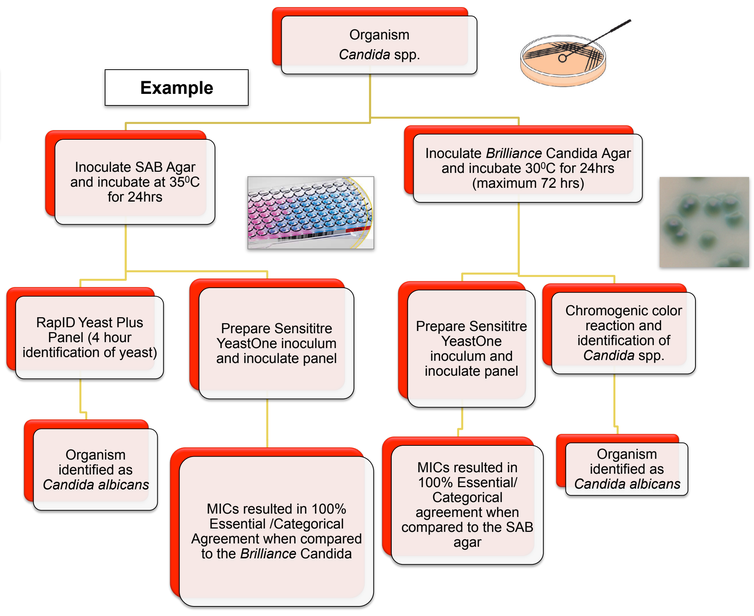
•100 isolates including 38 *C. albicans,* 16 *C. tropicalis,* 24 *C. glabrata,* 10 *C. parapsilosis,* 5 *C. lusitaniae*, and 7 *C. krusei*, were inoculated onto *Brilliance* Candida agar and Remel Sabouraud Dextrose Agar (SAB). All plates were incubated at 35±1°C for 24 hr as per manufacturer's instructions.

•Sensititre (YO9) susceptibility testing panel consists of the following 9 antifungals: Micafungin, Caspofungin, 5-Flucytosine, Posaconazole, Voriconazole, Itraconazole, Fluconazole, Anidulafungin, and Amphotericin B.

•Sensititre panel inoculum were prepared from colonies grown on both *Brilliance* Candida Agar and SAB plates. The plates were set-up and tested according to the manufacturer's instructions.

•RapID Yeast Plus System was directly inoculated from the SAB plates and were set-up and tested according to the manufacturer's instructions.

•QC testing was performed following the manufacturer's instructions and CLSI M27-A3 and M27-S4.



Results

% Agreement of *Candida* spp. Between the RapID Yeast Plus and the *Brilliance* Candida Agar

Organism Group	Number of Isolates Tested: RapID Yeast Plus	Number of Isolates Tested: *Brilliance* Candida Agar
Candida albicans	38/38	38/38
Candida glabrata	24/24	24/24
Candida tropicalis	16/16	16/16
Candida parapsilosis	10/10	10/10
Candida lusitaniae	5/5	5/5
Candida krusei	7/7	7/7
% Agreement of Identification Between the RapID Yeast Plus and *Brilliance* Candida	**100%**	**100%**

% Essential Agreements (+/- 2 $\log_2$ dilutions) and Categorical Agreements of *Candida* spp. Between SAB Agar and the *Brilliance* Candida Agar

Organism Group	% Essential/Categorical Agreement
Micafungin	100/100
Caspofungin	100/100
5-Flucytosine	100/100
Posaconazole	100/100
Voriconazole	100/100
Itraconazole	100/100
Fluconazole	100/100
Anidulafungin	100/100
Amphotericin B	100/100
% Essential /Categorical Agreement of MICs Between the SAB AGAR and *Brilliance* Candida Agar	**100/100**

Conclusions

• The Sensititre YeastOne susceptibility testing panel can be used as a direct susceptibility test for suspect organisms isolated on *Brilliance* Candida Agar. The prior use of *Brilliance* Candida Agar compared to the SAB does not influence the MIC result.
• The Sensititre YeastOne susceptibilty testing panel can also be used in combination with the 4 hour RapID Yeast Plus System for a rapid identification and susceptibility result.
• Either of these combinations of testing, *Brilliance* Candida Agar with the Sensititre YeastOne susceptibility panel, or the YeastOne with RapID offers a rapid, simple solution for identification, confirmation and antifungal susceptibility testing of *Candida* spp.

References

Clinical and Laboratory Standards Institute. **2008**. *Method for Broth Dilution Antifungal Susceptibility Testing of Yeasts; Approved Standard-Third Edition.* Approved document M27-A3. Wayne, PA: CLSI.

Clinical and Laboratory Standards Institute. **2012**. *Reference Methods for Broth Dilution Antifungal Susceptibility Testing of Yeasts; Fourth Informational Supplement* M27-S4. Wayne, PA: CLSI.

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