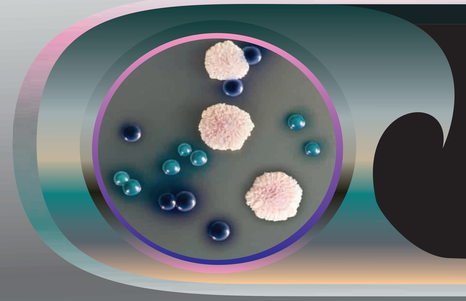

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Comparison of HardyCHROM™ Candida with the Vitek Yeast Biochemical Card Identification System for the Identification of Common Yeast Pathogens

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HARDY DIAGNOSTICS

Revised Abstract

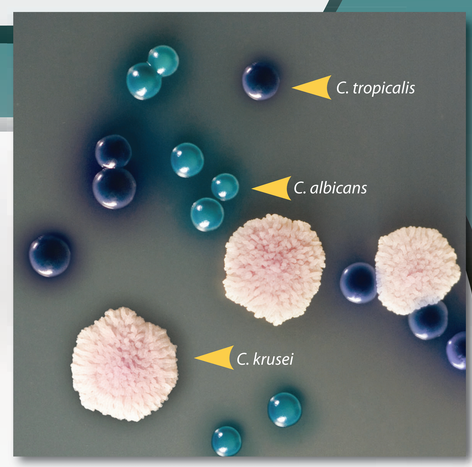
Candida species are common human commensals that are capable of causing a wide variety of diseases. In the past, invasive candidiasis was most commonly associated with *Candida albicans*, but recently other species, such as *C. glabrata*, have become common causative agents for this type of infection. In the last few years candidiasis has been steadily increasing in the United States, and is now considered to be the fourth most common cause of nosocomial septicemia. Since these types of infections have an estimated fifty percent mortality rate, early detection is vital to ensure proper diagnosis and treatment. In an effort to expedite clinical identification and to save labor and supply costs a study was performed by Central Coast Pathology Consultants to assess the effectiveness of HardyCHROM™ Candida for species identification. HardyCHROM™ Candida contains chromogenic substrates that interact with the unique enzymes produced by the most common strains of pathogenic *Candida* spp., which allows for species identification based solely on colony morphology and color. According to the manufacturer's technical insert, strains of *C. albicans*, *C. tropicalis*, and *C. krusei* can be identified within 48 hours without further additional testing, while strains of *C. glabrata* can be presumptively identified. In this study a total of 101 clinical isolates were identified using both HardyCHROM™ Candida and the Vitek Yeast Biochemical Card identification system. From the 101 isolates tested, HardyCHROM™ Candida was found to have an overall 99% specificity rate when compared to the Vitek Yeast Biochemical Card identification system. *C. albicans*, *C. tropicalis* and *C. krusei* were identified with a specificity of 100%. *C. glabrata* and *C. parapsilosis* were identified with a specificity of 93% and 100% respectively. Overall, this study suggests that the chromogenic medium, HardyCHROM™ Candida is an accurate and cost effective way to easily differentiate and identify commonly isolated clinical yeast strains.

Introduction

The incidence of fungal infections has dramatically increased due to several factors, such as increased numbers of immunocompromised patients and the widespread use of broad-spectrum antibiotics. At this time *Candida albicans* is the most frequently isolated yeast pathogen, but *C. glabrata* is rapidly emerging as a common cause of nosocomial yeast infections. Other pathogenic yeast species isolated from clinical samples include *C. tropicalis* and *C. krusei*, though these are isolated less frequently in comparison to *C. albicans* and *C. glabrata*.

Ideally, laboratories should be able to detect and identify the major Candida species associated with clinical specimens in order to quickly and accurately prescribe treatment. Most clinical laboratories start the yeast identification process with the germ tube test and then continue with more extensive testing. Unfortunately reference identification procedures that use biochemical and morphological studies are often impractical in that they are expensive, labor intensive, and only provide results after several days. Likewise, conventional methods of yeast identification consist primarily of assimilation and fermentation studies which tend to be cumbersome and labor intensive. Due to these factors there has been a great demand for the development of a differential primary media, which would allow for the rapid and reliable identification of the most commonly encountered pathogenic yeast strains.

HardyCHROM™ Candida uses a combination of chromogens for the detection of the most commonly isolated yeast pathogens. The chromogens in this media release chromophores when cleaved by enzymes unique to certain Candida species, resulting in species-specific colored colonies that allow for easy identification. In this study, HardyCHROM™ Candida was evaluated for performance and accuracy in the identification of commonly isolated clinical Candida species. The media results were later compared to the results obtained from the Vitek Yeast Biochemical Card Identification System.



Materials & Methods

This study evaluated a total of 101 clinical yeast specimens that were isolated from patient swabs received by the Central Coast Pathology Consultants laboratory. These isolates were used to inoculate HardyCHROM™ Candida plates. Colony color and morphology were evaluated after 48 hours of incubation at 35°C. The isolates used in this study were also identified with the Vitek Yeast Biochemical Card Identification System, which served as the gold standard for this study.

Results

The isolates identified by the Vitek Yeast Biochemical Card Identification System were as follows: *C. albicans* (n=60), *C. tropicalis* (n=6), *C. glabrata* (n=14), *C. krusei* (n=3), *C. parapsilosis* (n=12), *C. guillermondii* (n=1), *C. dubliniensis* (n=2), *C. kefyr* (n=2), and *C. famata* (n=1).
These results were then compared with the HardyCHROM™ Candida plate results, and the performance and specificity of the media was evaluated in the following data table:

Clinical Isolates identified using Vitek System (n)	Morphology and Color of Clinical Isolates on HardyCHROM™ Candida	HardyCHROM™ Candida	
		Sensitivity	Specificity
C. albicans (n=60)	All isolates produced smooth, apple-green colonies	100%	100%
C. tropicalis (n=6)	All isolates produced smooth, dark blue colonies with blue halos in the media	100%	100%
C. glabrata (n=14)	Thirteen isolates produced smooth, light pink colonies with dark mauve centers, while one isolate produced a light pink colony without a mauve center.	93%▪	100%*
C. krusei (n=3)	All isolates produced rough, light pink crenated colonies	100%	100%
C. parapsilosis (n=12)	All isolates produced dry, dark purple colonies.	100%*	100%*
C. guilliermondii (n=1)	Single isolate produced a smooth, mauve colony.	*	*
C. dubliniensis (n=2)	Both isolates produced smooth light green colonies	*	*
C. kefyr (n=2)	Both isolates produced a smooth, mauve colony.	*	*
C. famata (n=1)	Single isolate produced a smooth, tan colony.	*	*

*According to the product technical data sheet, HardyCHROM™ Candida is not intended for use in the identification of species other than *C. albicans*, *C. tropicalis* and *C. krusei*.
▪See Discussion

Discussion

HardyCHROM™ Candida was found to be an easy, accurate and reliable method for the rapid identification of clinically significant Candida species. Overall, this media demonstrated a specificity rate of 100% for the identification of *C. albicans*, *C. tropicalis*, *C. krusei*, *C. glabrata* and *C. parapsilosis*. The technical insert for the product specifies that colonies of *C. glabrata* appear most often as pink with a darker pink center. This study demonstrated that when the colonies have this appearance, the specificity rate was 100% (13 out of 13 isolates). One isolate was pink but did not produce a darker pink center. Thus, the sensitivity for the identification of *C. glabrata* is 93%. It was also found that *C. parapsilosis* produced unique dark purple colonies that were easily identified with 100% accuracy. Further studies using HardyCHROM™ Candida with a greater number of specimens may support the color and morphology descriptions for the other less common Candida species (*C. dubliniensis*, *kefyr*, *guillermondii* and *famata*) identified in this study.

Conclusion

The chromogenic medium HardyCHROM™ Candida is an easy, accurate, and cost effective method to easily differentiate and identify *C. albicans*, *C. tropicalis*, *C. krusei*, *C. glabrata* and *C. parapsilosis* by colony color and morphology.

References

1. Manafi, M. 2000. New developments in chromogenic and fluorogenic culture media. Int. J. of Food Microbiol.; 60:205-218

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